CSL

[illegible] 4

5/2/62

COTTON HAND-BOOK,

From the FOR Author

BENGAL:

BEING A DIGEST OF ALL INFORMATION AVAILABLE FROM
OFFICIAL RECORDS AND OTHER SOURCES
ON THE SUBJECT OF THE
PRODUCTION OF COTTON IN THE BENGAL PROVINCES.

RB-810

COMPILED BY
J. G. MEDLICOTT, B. A.

PUBLISHED IN ACCORDANCE WITH THE RESOLUTION OF
HIS EXCELLENCY THE GOVERNOR-GENERAL IN COUNCIL, DATED 22ND JULY 1861.

CALCUTTA:
SAVIELLE & CRANENBURGH, *Printers*, BENGAL PRINTING COMPANY LIMITED.
1862.

CSL

AS-004560

IND-47
338.17351
MED-C

5447-1
338.1735109544
Med-C

338.1
M52C

cop. 1

CENTRAL SECRETARIAT LIBRARY
Division Indiana
Acc. No.
Date of Accng.
Call No.
Processed Checked
Date of Transfer

GSL

TABLE OF CONTENTS.

RESOLUTION by his Excellency the Governor-General in Council, 1—5.

PREFACE, i—iii.

INTRODUCTORY CHAPTER—State of Indian Cotton trade, 1—16. Prospects of the trade, 17—24. Difficulties which have impeded its growth, 25—27.

PART I.

Section I.—Lower Provinces of Bengal.

General aspect of Bengal, 28. The seaboard, 29—31. The alluvial flat, 31—34. The uplands, 34—36. Physical conditions more in detail, 36—39. The map, 39—41. The question of profitable production, 41—55.

Patna Division, 55.

Districts.—Patna, 56. Shahabad, 57. Behar, 62. Tirhoot, 65. Sarun, Chumparun, 66.

Bhaugulpore Division, 68.

Districts.—Monghyr, 68. Purneah, 69. Bhaugulpore, 70. Sontal Pergunnahs, 71.

Rajshaye Division, 74.

Districts.—Rungpore, 75. Bogra, 78. Dinajepore, 78. Malda, 79. Rajshaye, 79. Pubna, 79. Moorshedabad, 80.

CSL

NUDDEA DIVISION, 81.

Districts.—Soonderbunds, 81. 24-Pergunnahs, 85. Nuddea, 89. Jessore, 90.

BURDWAN DIVISION, 91.

Districts.—Beerbhoom, 91. Burdwan, 93. Bankoora, 93. Midnapore, 94. Hooghly, 95. Hidgelee, 96.

CUTTACK DIVISION, 96.

Districts.—Balasore, 97. Cuttack, 97. Pooree, 99. Jungul Mehals, 100.

DACCA DIVISION, 101.

Districts.—Dacca, 105. Furreedpore, 112. Mymensing, 112. Backergunge, 113. Sylhet, 113. Cachar, 114. Jynteah, 116.

CHITTAGONG DIVISION, 116.

Districts.—Tipperah and Bulloah, 117.

Chittagong, 118.

Chota Nagpore, 120.

Assam, 125.

Arracan, 135.

Pegu, 138.

Tenasserim, 152.

Singapore, 156.

Andaman, 157.

TABLE I.—Prices of Cotton in the Bengal bazars, 159.

TABLE II.—Tabular abstract of the replies to the six questions of 1848 for Lower Provinces, 160.

Section II.—BENGAL, UPPER PROVINCES.

General aspect, 165. The Doab, the Terai, 166. Bundelkhund, 167. Experiments, irrigation, 169. Mr. Muir's epitome, 170. Mr. Saunders' report, 173. The map, 177.

BENARES DIVISION, 178.

Districts.—Ghazeepore, 179. Azimghur, 180. Goruckpore, 180. Mirzapore, 183. Benares, 184.

ALLAHABAD DIVISION, 187.

Districts.—Allahabad, 189. Futtehpore, 194. Cawnpore, 194. Banda, 195. Hummeerpore and Calpee, 198.

AGRA DIVISION, 204.

Districts.—Etawah, 204. Furruckabad, 205. Mynpoorie, 205. Muttra, 205. Agra, 206.

ROHILKHUND DIVISION, 208.

Districts.—Shajehanpore, 210. Budaon, 210 Bareilly, 210. Mooradabad, 212. Bijnour, 212. Kumaon, 213.

MEERUT DIVISION, 213.

Districts.—Allighur, 213. Bolundshahar, 214. Meerut, 215. Mozuffernuggur, 216. Saharunpore, 216. Dehra Doon, 217.

DELHI DIVISION, 218.

Districts.—Goorgaon, 219. Delhi, 219. Rohtuk, 226. Paniput, 226. Hissar, 226.

Section III.

Oude, 228. The Punjab, 232. Central India, 242. Rajputana, 243. Gwalior, 244. Malwah, 245. Chanderi, 247. Bundelkhund (native states), 252. Rewah, 254. Nerbudda valley, 254. Sagur and Nerbudda Territories, 256. Berar, 256. Nagpore, 258. Raepore, 265. Nagpore, 268. Chandah, 269. Chindwarra, 270. Bhundarra and the Godavery districts, 270. Hyderabad, 271.

TABLE III.—Tabular abstract of replies to the six questions of 1848, for the Upper Provinces, 285.

TABLE IV.—Average prices in the different divisions, 287.

TABLE V.—Prices of Cotton from 1755 to 1860, 289.

TABLE VI.—Decennial and quinquennial average of Cotton exported from Bengal, 291.

TABLE VII.—Prices of Indian Cotton in England, 292.

TABLE VIII.—Relative proportion of Indian to other Cotton in English market, 292.

TABLE IX.—Total imports of Indian Cotton into England, 292.

TABLE X.—Total imports of Bengal Cotton into England, 293.

PART II.

NARRATIVE OF EXPERIMENTS.

Akra Farm, 296. Report on cultivation, 297. Opinion on results, 299. The 4 American Planters, 304. Original intention, 305. Lord Auckland's views, 304-305. The Agricultural Society's project, 305-306. Mr. Prinsep's Minute, 306-307. The Court's reply to the above, 308. Dr. Royle's Memo., 308-309. Captain Bayles' views, 309. Location of planters, 310. Operations in 1841, 310—316. Operations in 1842, 316—327. Operations in 1843, 327—336. Operations in 1844, 337—341. General remarks, 342—344. Mr. J. O. Price in Dacca, 344—364. Mr. Price in Assam, 364—368. Mr. Price in Pegu, 369. Mr. H. H. Bell's experiment, 369. Mr. Thomason's Minute, 369—371. Mr. Allan's estimate, 371-372. Conclusion, 379-380. Machinery, 381. Early attempts, 381. Captain Bayles, 381. Mr. Mather at Agra, 383. Major Jenkins' prize, Mr. Burn, and Mr. Petrie, 384. The award, 385. First trial of Mr. Mather's churkas, 386. Their cost, 387. Opinions on them, 388. Cottage gins, 389. The native churka, 390-391. The 5,000 Rupee Prize, 391-392. Result, 393.

CSL 7

PART III.

Section I.—Chemical Papers.

Mr. Piddington on Cotton soils, 394—417. Dr. Royle on soils, 418—424. Messrs. Higgins and Bickell on Sea Island Cotton, its soils and manure, 424—432.

Section II.—The Cotton Plant and its Culture.

Dr. Thompson on varieties, and crossing them, 433—438. Mr. Mercer's rules for cultivation, 439-440. Dr. Wight on Cotton growing in India, 440—455. Native cultivation in Agra, 458—460. Dr. Royle on Cotton cultivation, 460—465. Rules for Cotton cultivation in India from the Agricultural Journal, 465—469. On irrigation, 469—475.

CSL 8

AN ALPHABETICAL LIST

OF THE

DIFFERENT VARIETIES OF COTTON, NATIVE AND EXOTIC, TO WHICH REFERENCE IS MADE IN THIS VOLUME, WITH THE LOCALITIES WHERE CULTIVATED.

N. B.—The figures refer to pages.

Bagcheni.—Agra, 378.

Banda.—Goruckpore, 330, 332.

Bhagella.—Malwah, 247.

Bhochurri.—Malwah, 247.

Bhyratta.—(ordered for general trial), 3. Dacca, 108. Malda, 79.

Boga.—Assam and Rungpore, 103. Beerbhoom, 91. Dacca, 109.

Borailli.—Mymensing, 103.

Bourbon.—Akra Farm, 298. Birmah, 143. Cachar, 115. Chota Nagpore, 123. Cuttack, 98. Dacca, 111, 345, 349, 355, 362, 363. Goruckpore, 182, 338. Kotra Farm, 314. Saharunpore, 216. Shorapore, 275. Singapore, 156.

Bunnee.—Hyderabad, 283. Nagpore, 269.

Chicktee.—Raepore, 266.

Chintea.—Rungpore, 77.

Dacca.—(fine var.) Dacca District, 356, 357, 362.

Dhania.—Assam, 366.

Dhera.—Assam, 125, 130, 365.

Egyptian.—Agra, 207. Birmah, 143. Calcutta, 86. Dehra Doon, 217. Delhi, 221, 223. Gowhatti, 127. Hazareebaugh, 121. Henzadah, 144. Hyderabad, 278, 279. Jullundur, 233. Kishnagur, 89. Meerut, 215. Seoni, 255. Shahabad, 57, 58. Shajehanpore, 210. Tharrawaddi, 147.

Kooktee.—Goruckpore, 181, 338.

CSL

Jirree.—Hyderabad, 283. Nagpore, 269.

Jubbulpore.—Bundelkhund Farms, 325. Goruckpore, 330, 332.

Mexican.—Agricultural Society's Garden, 88. Allahabad, 191, 192. Banda, 196. Beerbhoom, 92. Benares, 187. Bhaugulpore, 71. Bhowulpore (Rajputana), 244. Bundelkhund Farms, 325. Buxar, 60. Cawnpore, 195. Chittagong, 119. Dacca district, 350. Delhi, 225. Goruckpore, 181, 183. Gyah, 62. Hazareebaugh, 122. Leia (Punjab), 237. Lucknow, 229. Ranchee, 122. Rauth Farm, 312. Shahabad, 58. Somirpore Farm, 311. Sontal Country, 72. Soonderbunds, 82.

M'hali.—Malwah, 290, 292.

Munnoa.—Allahabad, 192. Benares, 184. Goruckpore, 181.

Nankeen.—Agra, 207. Birmah, 140. Delhi, 221, 223. Meerut, 215.

New Orleans.—Agricultural Society's Gardens, 88. Allahabad, 190. Akra Farm, 298. Andaman Island, 157. Banda, 197. Beerbhoom, 92. Bolaram, 276. Bolundshahar, 215. Cuttack, 99. Dacca, 111, 345, 350. Delhi, 220, 225. Hyderabad, 276, 280, 282. Kishnagar, 90. Mymensing, 104. Patna, 56. Rungpore, 76. Shahabad, 58-61. Shajehanpore, 210, Shorapore, 275, 281. Soonderbunds, 83. Setapore (Oude), 231. Tharrawaddi, 148.

Nurma.—Benares, 184. Burdwan, 93. Chanderi, 248, 249. Dacca, 108. Goruckpore, 338. Malda, 79. Saharunpore, 216.

Patna.—Dacca district, 111, 356, 357, 362.

Pakhy.—Malwah, 247.

Phootee.—Dacca, 108-9.

Pernambuco.—Barrackpore, 86. Birmah 141, 143, 151. Dacca, 111. Delhi, 225. Jessore, 90. Singapore, 156. Soonderbunds, 88. Tavoy, 152, 153.

Peruvian.—Allahabad, 190. Calcutta, 87. Cuttack, 98. Delhi, 220, Seoni, 255. Soonderbunds, 82.

Petti Gulph.—Buttal, 238. Luckimpore, 129.

Protective.—Upper Assam, 128.

Raota.—Rhotas, 62.

Rarhia (Rarea—Rurrea).—Allahabad, 192. Behar, 64. Benares, 184. Rhotas, 61.

SEA ISLAND.—Agricultural Society's Gardens, 89. Akra Farm, 297, 298. Allahabad, 190. Arracan, 137. Beerbhoom, 92. Buttala (Punjab), 238. Cachar, 115. Cuttack, 98. Dehra Doon, 217. Delhi, 220, 223. Gyah, 62. Kotra Farm, 314. Hyderabad, 276. Luckimpore, 129. Mutla, 82. Rauth Farm, 312. Sagor Island, 82, 303. Somirpore Farm, 311. Soonderbunds, 83, 85. Tharrawaddi, 148. Tirhoot, 65.

SERONJEE.—(a Malwah Cotton imported into) Dacca, 109.

SEYCHELLES.—Agra, 207. Akra Farm, 298. Assam, 129. Birmah, 143. Soonderbunds, 83.

SHERAJ.—Dacca, 102.

TANJORI.—Dacca, 103.

TENESSEE.—Calcutta, 87.

TIPPERAH HILL (*var.*)—Dacca district, 362.

TWIN-BOLL'D.—Allahabad, 191. Kotra Farm, 314.

UPLAND GEORGIA.—Akra Farm, 298, 303. Allahabad, 189, 190. Barrackpore, 86. Beerbhoom, 91. Bhaugulpore, 70. Cuttack, 98, 99. Dehra Doon, 217. Delhi, 219, 223. Goruckpore, 337. Henzadah, 144. Hissar, 226. Singapore, 157. Tharrawaddi, 147. Tirhoot, 65.

WULLAH.—Raepore, 266.

CSL

SUPPLY OF INDIAN COTTON TO ENGLAND.

RESOLUTION BY HIS EXCELLENCY THE VICEROY AND GOVERNOR-GENERAL IN COUNCIL.

Fort William, the 22nd July 1861.

Record of inquiries and experiments for the encouragement of Cotton cultivation in India.

THE questions of how to increase the supply of Cotton, and how to improve its quality, have, at various times, for many years past, occupied the attention of the Government of India, and very much information on these subjects is on record in manuscript, besides the voluminous selections which, from time to time, have been published in various shapes, both in India and England.

But some of these compilations have become scarce, and others are in forms which preclude easy reference to them ; nor is there any single volume, or series of volumes, which would be of much practical use as a guide to any person desirous of learning what had been done in each Province, and with what result, to improve and increase the production of Cotton, and in what direction further efforts are required, or are most likely to be successful.

GSL

Moreover, an examination of the records of former experiments proves that questions are now being raised and discussed, which have, on former occasions, been very fully investigated and decided, and in the further examination of which, if any be required, much valuable time and labor may be lost.

The Governor-General in Council therefore resolves that the records of each Government on this subject shall be placed at the disposal of some gentleman who may be selected as able and willing to undertake a careful analysis of their contents, and to publish the result within a reasonable period, in a form calculated to be useful as a Guide or Hand-book to persons interested in the cultivation of Cotton in India. One gentleman will be selected by the Government of India, to whom the records connected with the several Lieutenant-Governorships and Provinces directly subordinate to the Governor-General in Council will be entrusted, and two other gentlemen will be similarly appointed by the Governments of Madras and Bombay, respectively, for the purpose of preparing a compilation from the records of those Presidencies.

Each work should comprise a sketch of all that has been done within the limits of each Government, by or with the aid of the Government, from the time when the supply of Cotton first became an object of interest to the East India Company. The measures which from time to time have been adopted, and their results, should be stated succinctly, with no more detail than is likely to be of interest or utility to persons now engaged in similar enquiries or speculations. Any papers, which

GSL

from their general importance or the amount of local information they contain, are likely to be useful in extenso, may be given in an Appendix. The compilation should not be restricted to the records of the Indian Governments, but should admit any thing in the evidence taken before Parliamentary Committees, in the transactions of scientific bodies, in books of travels, or in publications like those of Dr. Forbes Royle, which may bear upon the prospects of Cotton cultivation within the Provinces for which the compilation is made.

Of necessity there will be much repetition in the three compilations simultaneously prepared. But this will be in no way incompatible with the object in view, which is to furnish a complete digest of all that the archives of India at large contain of present practical value to the cultivator or trader in Cotton; a Hand-book, in fact, of such information as each local Government can supply, and one which shall relieve the enquirer from the necessity for reference to official records in bulk, or to other previous publications.

The latest official statistics of trade, or cultivation, should be given, and for this or any other information the compiler will be authorized to call on the local officers of Land Revenue, or Customs, through the Secretary of the local Government, and the information should be furnished in such shape as may appear most likely to be of practical public utility.

Maps should be added, not only to illustrate the localities referred to in the text, but so drawn as to show the districts where Cotton is or may be grown, and the lines of road and river by which it is exported.

CSL

The officers of the Surveyor General's or Public Works Department at each seat of Government will be directed to comply with any requisition which may be made on them for this purpose through the local Government.

It is essential that the task should be completed with as little delay as possible. An imperfect compilation, which might be available within the next six months, would be far more useful than one which thoroughly exhausted the subject, but which could not be published till a year hence. Should the work prove really useful, further editions will doubtless afford scope for any additional matter of real value which may come to light after the first publication.

With a view, therefore, to a speedy execution of the task, it is desirable that it should be entrusted to one who is not trammelled with other official duties, unless they happen to be such as leave him ample leisure for such a task. The Governor-General in Council will be willing to sanction any suitable remuneration. It is desirable that this should be in the shape of a fixed sum rather than of a salary. The Government of India will also bear the expenses of an edition of as many copies as it may be thought desirable to have for distribution by Government. The Government will reserve as many copies as are needed for the use of its own officers, and any profit from the sale of surplus copies to the public, or from any further edition which may hereafter be required, will be accounted for to the author.

The person selected should be placed in communication with the local Agents of the Cotton Supply Association, and should

GSL

refer freely to the Agent on all questions regarding which his opinion or assistance may be useful. Any official documents which the Agent may consider of special and immediate importance to the object of the Association should be at once placed at his disposal, with a view to its being made available in any mode the Association may desire, without waiting for the publication of the complete work, on which the compiler is engaged.

(Signed) W. GREY,
Secretary to the Government of India,
Home Department.

CSL 13

PREFACE.

THIS volume is an attempt to give effect to the above resolution so far as regards Bengal, and the several Lieutenant-Governorships and Provinces directly subordinate to the Governor-General in Council. It obviously formed no part of the intention of the Governor-General in Council that it should contain advice, or directly suggest practical conclusions to those interested in obtaining from India a supply of Cotton for the English market.

The work is a compilation, a digest of recorded evidence on the subject of the cultivation and commerce of Cotton in India, and the object kept constantly in view was, to present the reader with an analysis as exhaustive, and a summary as complete, of all available information as the shortness of the time assigned for the execution of the work would admit of. In order to present this information to those who might require it, in the most convenient form, the following arrangement was adopted, in the belief that it was best calculated to facilitate reference to localities, to dates, and to subjects, with the least practicable risk of needless repetition.

The book is divided into three Parts: the first Topographical, the second Chronological, the third of the nature of an Appendix.

PART I. constitutes the *Hand-book* properly so called: in it is arranged, under the head of each district, all the information obtainable relating to that district, as a Cotton-producing area. Section I., of this Part, treats of the Lower Provinces of Bengal, and includes also the South-Eastern Dependencies, British Burmah, &c. Each of the Commissioner's divisions has been taken by itself, and each of the districts into which these are fiscally sub-divided, is separately described as fully as the available means permitted. The same plan has been followed in Section II., of which the North-West Provinces form the subject, and also, as far as possible, in Section III., which is made to include all those parts of British India above indicated as forming the subject matter of this volume, and which, at the same time, could not conveniently be brought into the former Sections. Oude, for instance, topographically belonging to Section II., is placed in Section III., because no mention is ever made of it in the official returns, &c., referring to the North-West Provinces.

PART II. contains the history of the different experiments that have been instituted by Government, or by private individuals, on the improvement of Cotton cultivation in India. The narrative is condensed, and this section claims to be but an abridged sketch of the principal trials made: short accounts of many of those made on a smaller scale finding a place in Part I.

Here, too, will be found some account of what has been done in reference to the cleaning of Cotton and its preparation for the market, and of some of the attempts to invent, improve, and adapt machinery for this purpose.

PART III. consists of extracts, selected from published works, or official papers, which appeared to the compiler to be of interest in connection with the subject of Cotton growing in India; either intrinsically so, or else important from the authority attaching to the names of their authors. These could not conveniently have found a place either in Part I., or Part II., they have been therefore placed by themselves, and arranged in sections under different heads as "Chemical Papers," &c.

Such of the documents as it was thought practicable to condense, without materially lessening their value, are given in the form of abstracts, and those are re-printed in extenso, to which an abridgment might not have done justice.

CSL 14

It was however found that there still remained much which did not appear naturally to find a place in any of these three Sections, notwithstanding that it seemed of considerable interest in connection with the question of the supply of Cotton obtainable from the Bengal Provinces. An introductory chapter has been accordingly prefixed, in which this matter is discussed the more appropriately, as it mainly has reference to such general questions as are alike applicable to all parts of the immense area which forms the subject of the work.

CSL

COTTON HAND-BOOK.

INTRODUCTION.

BEFORE proceeding to treat in detail the more obvious and specific subject of this Hand-book, I have thought that it would be useful to present, in the form of an Introduction, a brief abstract of certain facts, which, although long known, are not universally recognized, and the conclusions legitimately deducible from which, although more than once clearly pointed out, are not very generally accepted in practice. This seems the more desirable, as there appears to be some reason for supposing that on the practical application of some of them, the future success or failure of the Indian Cotton Trade may turn. A knowledge, moreover, of these facts, and an opportunity of forming an opinion on the conclusions which they suggest, is an almost necessary preliminary to a correct appreciation of the detailed information to follow. They will be taken in the following order :—

1*st.* The general question of the state of the Indian Cotton Trade, past and present.

2*nd.* The prospects of the trade, and specially whether the cultivation in India of Indigenous Cotton for the European market can be made profitable.

3*rd.* Some of the difficulties which have been supposed to impede the profitable cultivation of Cotton in India.

1*st.*—THE STATE OF THE INDIAN COTTON TRADE.

In the year 1783 it is stated* that 114,133 lbs. of East Indian Cotton were sent to England.

---

* "Reports and Documents in regard to Cotton Wool, &c.," 1836.

CSL

General J. Briggs however informs us* that "Cotton reached the "English market from India for the first time in 1789, through the "circuitous route of Flanders and Denmark, and not direct through "the English East Indian Company;" it had been exported from Surat, and exertions were at once made by the English traders in the East, to procure it direct. In 1790 there were 422,207 lbs. imported,† and General Briggs states that it was not until "ten years afterwards "(that is after 1789) that it became an article of considerable "import to Great Britain, from the British Territory in the East."

Subsequently larger quantities were sent, and 1818 may be taken as the date about which India and America entered into competition for the command of the English Cotton market: in that year 247,000 bales of Indian Cotton appeared there, against 207,000 bales of American.

The result of the contest is too well known to need even the briefest recapitulation here: it did not long remain doubtful: the respective quantities of Indian and American Cotton in the English market never again approached each other: in the latter there was a steady, yet rapidly progressive increase, in the former extraordinary fluctuations; thus in 1822 the Indian imports had fallen to 20,000 bales, in 1841 they had risen again to 278,000 bales, in 1848 sunk again to 49,000 bales, and in 1857 they amounted to 28,000,000 lbs. America, in short, soon gained command of the market, and Indian produce obtained a place there, only as a supplementary source of supply, resorted to in the event of a short crop from the Western Continent.‡

---

* Cotton Trade of India, page 5.

† Reports, &c., 1836.

‡ Although, as stated, the quantity of Indian Cotton which appears in the English market has sunk into utter insignificance relatively to the American, yet there has been a positive increase, small and fluctuating, but perceptible, when the figures representing it are arranged in quinquennial averages. This is well shown by a diagram of prices and quantities from 1806 to 1849, appended by Dr. F. Royle to his admirable work on the *Culture and Commerce of Cotton in India.* London. 1851.

Character and quality of Indian Cotton.

We find that long before America had presented herself as a rival, the quality of the East India Company's Cotton had become a subject of complaint. In 1803 the Court lament that dirt and leaves, mixed with the wool, had depreciated the value of the Cotton sent them. In 1810 they wrote to Bombay "that no "excuse will hereafter be admitted by us for the foulness, dirt, and "seeds which are permitted to remain mixed with the Cotton: and "it is our positive orders that the commission be not paid to any "commercial resident whose provision of Cotton shall be faulty in this "particular."

In 1829 they again remind their agents that cleanness is all-important, and promise to send to India some "Whitney's gins," with a view to improvement in this respect. In this same letter they state that their Indian Cotton has hitherto been sent to Europe in highly compressed bales, whereas that from America had only lately been packed in bales at all, having until then come loose in bags, and they order a portion of the next consignment forwarded to them to be prepared in this way, in order that they may have an opportunity of seeing if the iron screw presses in use had really injured the staple or not.* The attention of the Indian Government is drawn to the importance of the indigenous short-stapled varieties, and it now sounds strange that the one selected, and recommended for trial throughout India, was a Bengal kind, called Bhyratta †: far more strange however does the reason now appear which is assigned for the preference shown for

---

* Bengal Cotton they state reached England pressed to 1,517 lbs. to the ton of 50 feet, Bombay Cotton 1,312 lbs. to the same cubic space. The New Orleans bales were only 844 lbs. to 50 cubic feet, and it was ordered that at least one-tenth of the coming consignment should be put up in bales of about 900 lbs. to the ton—that is, that the bale which hitherto weighed 363 lbs., should now weigh only about 249 lbs.

† This was the finest of the Dacca Cottons, and was, in consequence of this order, experimentally planted in many places throughout Bengal: without success however.

CSL

short staple Indian Cotton. The letter goes on to state, that of the experiments instituted with a view to improve the quality of Indian Cotton, up to that time (1829), all those that had been on "a scale of commercial usefulness" had been confined to the Bourbon variety, "which," they say, "yields a longer staple than any other kind of Cotton, "and the demand for which has been checked by the unexpected "difficulty of finding a market for the increased supplies of long-stapled "silky Cottons, as, since 1823, the Egyptian and other long-stapled "Cottons had overstocked the market." The Upland Georgia is given as a standard of value, and certain India indigenous kinds are stated to be, if properly cleaned, equal to this: besides the Bhyratta, a Broach Cotton, and one from Tenasserim, are instanced.

If we pass over these anomalies, (which might be multiplied to a vast extent,) as, however interesting in themselves, rather connected with the archæology of the Indian Cotton Trade, than of direct importance in the present state of the question, and hasten on to the year 1838, when a great movement took place in reference to the possibility of obtaining from India a large and constant supply of Cotton for the English market, we shall find that then, and ever since, the quality of the produce was complained of, on the score of the same dirtiness which so early characterised it, as well as on that of its shortness of the staple: as to the foulness, the fact is so notorious, that it might almost be passed over without citing any testimony in confirmation, one however is given:—

Of the dirtiness of Indian Cotton.

Mr. A. Turner, President of the Commercial Association of Manchester, informed a Committee of the House of Commons, that the firm of which he was the head, largely used Indian Cotton, and that they annually threw away as refuse cleaned out of it, a quantity of filth for which they had paid no less than £7,000, and that this consisted of extraneous matter, such as clay, sand, &c.,

fraudulently introduced, or of twigs, leaves, seeds, &c., not originally separated from the fibre.*

Of the shortness of staple in Indian Cotton.

The shortness of the staple is of course a very much more material consideration than the foregoing, for however difficult it may be to obtain the Cotton in its natural condition, to alter that condition must be a still more arduous undertaking. On this subject much diversity of opinion exists, but before proceeding to detail some of it, we may reflect that, had Indian Cotton originally retained a vital hold on the English market, this shortness of staple might never have come to be considered so very fatal an objection: had large quantities of Indian Cotton continued to be worked up by the English spinners, the self-interest of all concerned would ultimately have effected a radical improvement in the cleanness, and probably also in the actual quality of the raw material; nor is it an improbable conjecture that British mechanical ingenuity would have succeeded in producing a fabric as fine as that of Dacca, and as stout and durable as nankeen cotton cloth, from the same materials as the Asiatic spinners and weavers employed. But in point of fact the Indian supply did fall off; the English spinners and weavers naturally adapted their machinery to the peculiarities of the material which they could most advantageously employ; and thus the Indian Cotton, which they once spun, ceased to be suited to their requirements.

Opinions unfavorable to quality of Indian Cotton.

Mr. A. Turner above quoted, went on to say that, even if well cleaned, Indian Cotton could not be more largely used by the English spinners than it then was (1847), unless an improvement could be effected in its intrinsic qualities; but that an improvement in the fibre to the extent of 10 or 25 per cent. would render it available

---

* For statements in confirmation see other evidence given before the same Committee of the House of Commons in 1847, also F. Royle's works, where the subject is exhausted.

CSL

to a very large extent. Other witnesses of high authority confirmed these views: among others, Mr. Bazely asserted that necessity alone would drive the spinners to use Indian Cotton.

The question seems to be fairly stated * as follows:—" The spinner " of No. 20 yarn says that it is his interest when Surat Cotton can " be bought for 3*d.* per lb., to give 3½*d.* for American, for that he " obtains from the Surat only 12 oz. of the yarn, while from the " American he obtains 13½ oz."

Again, Mr. J. Landon assured a Committee of the House of Commons, in 1858, that if only Indian Cotton could be procured in the English market, all the finer fabrics would cease to be made: by which statement, however, he may have only intended to imply that, inasmuch as the machinery now employed on all the finer fabrics was constructed exclusively for working a peculiar long-stapled American Cotton, *that* machinery could not be used on the equally fine but short-stapled Indian kinds.

Opinions favorable to the quality of Indian Cotton.

Mr. R. W. Crawford asserts that Cotton, such as can be procured in unlimited quantities from India, is well suited to 75 per cent. of Manchester manufactures.† Mr. Chapman states that Cotton fit for the English mills can be obtained to any extent from India, of such quality that it can be used for more than 50 per cent. of our manufactures, at certain relative differences of price, which he considers to average 15 per cent. less for the Indian than the American commodity.‡

This, it may be remarked, corresponds pretty exactly with the statement above quoted, to the effect that the relative values to the spinner were 3 and 3½*d.* per lb.

Mr. Bruce of Calpee sent home a considerable quantity of Bundelkhund-grown Cotton, which was sold at a rate slightly in advance of

---

* F. Royle. *Culture and Commerce of Cotton*, page 24.

† House of Commons Committee, 1847.

‡ Ibid.

GSL

the Surat, and at the price of the middling New Orleans of the same date. And Mr. Hamilton Bell had a precisely similar success with his Agra Cotton, as will be shown hereafter. The Cotton which he sent home for Government was sold at only $\frac{1}{4}$*d.* per lb. under the rate of middling New Orleans.

From all which it would appear that Cotton, indigenous to the Bengal Provinces, as well as that of other parts of India, is naturally of a quality, which, if fairly dealt with in culture, picked with ordinary care, and sent to market in an unadulterated state, and in large quantities, would be used by the English spinner for a very large portion of his coarser work, so long as second-rate American Cotton could not be cultivated profitably to under-sell it.

The object of those who have elaborately enquired into the condition of Indian Cotton was, of course, to remedy the defects they discovered: in order to have any reasonable prospect of doing which, it was necessary to make some approach to a just appreciation of the causes of those defects: Mr. Bazely clearly perceived this when he addressed the Chamber of Commerce of Bombay, on the part of the Chamber of Commerce of Manchester, of which he was President, announcing that[*] Mr. A. Mackay was going on a mission to India "to make full and impartial inquiry into the obstacles which prevent an increased growth of Cotton there. The simple fact[†] that the cultivation of Cotton has rather declined than increased; that although the manufacturing prospects of this country have for some years past been most injuriously affected by want of sufficient material, the efforts hitherto made to render the quality of Indian Cotton acceptable in this market, have been almost barren of results—the conflicting opinions—the certainty that

---

[*] December 1850.

[†] As has been stated, the decrease is only relative, positively there has been a small increase.

CSL

"India is capable of growing good Cotton, &c.—are grounds for "independent examination."*

If we seek an answer to the question here stated, as far as it may be found in the records of which this work forms a summary, it does not appear that the decline of the trade can be traced exclusively to any single cause. In the first place, it may be doubted whether any material decrease has taken place, in the aggregate amount of Cotton grown within the Bengal Provinces, since 1790. The evidence does not perhaps warrant any definite assertion either way; on the one hand, certain districts which once grew large quantities of Cotton have almost given up the crop; but on the other, some have as certainly extended its growth, and what is really the important element in the calculation, (although so difficult to estimate justly,) the vast quantity of Cotton grown every where in patches, for local consumption, has, it may fairly be presumed, kept pace with the general progress of agriculture, rather than diminished, as may have been the case with the Cotton crop specially cultivated for the market.

But it is not materially interesting to the English Cotton spinner whether more or less Cotton be grown in Hindustan. The trade, in which alone he is interested, has declined; Cotton is not grown for him; its quality has not been improved so as to be "acceptible in his market," and it is rendered still worse by the treatment it receives between the field and his mill.

The first cause of the decline.

Of the causes which have produced this result, the first would seem to be, that the origin of the export trade of Cotton to Europe from India was abnormal—for although the first commencement of this trade took the form of an ordinary demand of a foreign

---

* The results of Mr. Mackay's inquiries are before the public: he did not however extend his observations far in the direction of this side of India, and does not therefore directly concern the present compilation.

GSL

market for one of the agricultural staples of India, yet the natural development of the supply to meet it, with which we are more directly concerned, was from the first distorted by the anomalous political position of the merchants through whom the demand, in itself quite normal, had come; and thus the trade was not suggested by mutual interest, nor did it arise to meet any natural requirements of exchange: it was the offspring of motives and objects quite extraneous to India; it was initiated by her foreign masters for their own ends, and was carried on throughout, by Government agents. In spite then of the unimpeachable nature of the motives which originated and guided the proceedings, and of the intelligence of many of those who managed the details, the trade inevitably became bound up by internal restrictions,* alien to the spirit of a vigorous commerce, and inextricably connected with abuses, inseparable from such a system as that under which it existed.

When the motive power which had kept the machine in action was withdrawn, there nowhere existed any element of vitality which could supply its place: and if it be remembered that this occurred just about the time which would, in any case, have proved a crisis, when, in fact, the steady demand, which is the first condition of vitality in any trade, was already threatened, the result will no longer be surprising: while it was still possible to overtake America in the race, or at least recover enough of the lost ground to ensure a fair chance of appreciation, just then trade was left open, and the complicated and corrupt agency which had always obtained the Cotton under a kind of pressure comprehensible to those alone who understand the lower classes of Asiatics, was deprived of its

---

* In the matter of *external* restrictions it appears probable that the American Cotton trade has all along had to contend against difficulties little, if at all, inferior to those which affected that of India.

CSL

only regulating and restraining element: it was with the debris of this collapsed machinery that the existing Cotton trade inaugurated its labors, and it is clearly demonstrable from the evidence on record, that it would be difficult to imagine more ill-omened auspices. The East India Company abolished the practice of receiving taxes in kind, but there are not wanting links which would seem to connect the middleman of our times, and all his mal-practices, with the revenue subordinate official of old, who found in the adulteration of the Cotton he had extorted from unwilling growers, a ready means of enriching himself at the expense of his master, of the cultivator, and of the consumer of the article he debased.

Second cause of decline.

The internal restrictions, &c., above alluded to, have long disappeared, but the evidence on record certainly suggests that all the evils of the trade, the vicious constitution of which contains the poisoned element which stunts its growth, may, to no small extent, be traced up to the character which its origin had impressed on the machinery by which it was first carried on: but it would be obviously useless in examining into the question with the object of discovering remediable defects, to stop here. Systematic neglect, and fraudulent adulteration of the produce, may certainly be set down as a great and very active cause of the bad repute in which Indian Cotton is held in the English market. Complaints of this evil have been more loudly made in Bombay, scarcely less so in Madras, but decidely less in Bengal, though this may probably be due to the insignificance of the Bengal trade with England, for that it exists here also, is capable of the most satisfactory proof.

In explanation of a state of things seemingly so anomalous, as that the quality of the Cotton, so carefully attended to in America, should in

CSL

India be everywhere neglected, a great many statements have been made. Some of these are as follows:—

The middlemen "find their interest in adulterating the Cotton previous to disposing of it to the exporter.*

"The dealer finds for the unclean, but cheaper Cotton, a better return in Bombay, than for the cleanly gathered and dearer article.†

"The cultivator finds that as ready a sale is obtained for Cotton in a dirty and adulterated state, as when brought to the market in a clean and first-rate condition, while the difference in price between the two articles does not repay him for the additional time and labor.‡

"The price even for the best Cotton in the market is but little more than it is for the worst. Cotton that would be sold in England for 4½*d.* per lb., and Cotton that would only bring 3*d.*, will sell there (county markets) within 3 or 4 per cent. of the same value: the cultivators know this, and have no object in bestowing more care or labor."§

These extracts well serve as a sample of a very considerable mass of evidence, which goes to establish the same fact, and it would certainly seem rather childish to waste time in animadverting on the criminality of these petty dealers, who, after all, seem to do no more than their congeners have done, do, and, alas! may be expected still to do, in all times and places, whenever a direct temptation is held out to them, and certain success attends chicanery.

That the organization of the trade, by according complete impunity to fraudulent adulteration, offered a premium on dishonesty, is capable of proof. The following evidence is selected:—"An inferior and dirty

---

* Vaupell. Transactions of Agricultural Society of Bombay.

† Dr. Johnstone, Bombay Medical Service.

‡ Mr. Vibart, Commissioner of Revenue, Bombay.

§ Mr. Petrie, Evidence before Cotton Committee, 1848.

CSL

" article is a more profitable article of native trade, and even to " European merchants."*

An experiment was made many years ago by Colonel Skinner, (of which an account will hereafter be given,) on growing Upland Georgia Cotton, and he abandoned it because he found that his produce realized in the Calcutta market only the price of ordinary Bengals. The Cotton Committee of the Agricultural Society addressed him on the subject: " They regret that Colonel Skinner's opinion should have been formed " on such frail grounds; the Calcutta market can be no criterion (of " the value of Cotton), as parties here are interested in keeping down " the price of staples."†

Again, " it is moreover a mystery that a mercantile community like " that existing in Bombay, should contentedly continue purchasing ill " cleaned and badly cultivated Cotton Wool at the Presidency, when " an individual or company may here (Dharwar), on the spot, purchase " Cotton, grown if they please under their own instructions, clean it, " screw it, and ship it, at nearly half the price."‡

But the Bombay merchants addressed Government on the subject, and called on the authorities to take measures to prevent the dishonesty which had so fatal an effect on the Cotton Trade of India.

In forwarding to the Court of Directors the remonstrances of the Bombay Chamber of Commerce, the Bombay Government wrote thus— " Your Honorable Court will observe that the Chamber entertains the " opinion that a regulation or order of Government would be more " likely to induce the ryots to send their Cotton into the market in a " clean and pure state, than any measure which the merchants in the " trade could take. To us however it appears that the merchants

---

* Mr. Finnie and Mr. Mercer's letter to Government.

† *Agricultural Transactions*, 1838.

‡ Mr. Shaw, Bom. C. S.

CSL

" alone have the power of obliging the growers to bring their Cotton " into market in an unadulterated state, by discouraging the tender of " a dirty and inferior staple, and that it would be useless for Govern- " ment to attempt, by any regulation, or other means, to effect this " object, so long as the ryot can realize a high price for his produce, " without incurring the trouble and expense of carefully picking and " cleaning it."—November 1839.*

" The merchants (of Bombay) describe themselves as finding it " difficult to come in contact with the cultivator in the country, for " they are but a small body, barely sufficient for the transaction of " their local business, and in most cases the agents of others, whose " orders they must comply with. The merchants here are therefore " guided in their purchases by the orders they receive from their " constituents at home, and the execution of these orders is always " limited to time. They are thus wholly dependent on the Cotton " to be found at Bombay, whatever be its quality. The price of Cotton " is morever not within their control, as depending on the state of the " China, or on that of the Liverpool market: this latter wholly in- " dependent of the quality of Bombay Cotton, being generally regu- " lated by the prices of American Cotton, and this last depends, not " only on the greater or less amount of the supply, but on the state of " the money market in Great Britain and America, and the banking " operations of the two countries."†

A connection between the abnormal origin of the Indian Cotton Trade, and its present radically vicious condition was, with some hesitation, suggested: none need be felt in tracing to the intrinsic defects of the trade, as above described, the third great cause of its decline: the connection between them is simply one of cause and effect, and cannot be denied.

---

* Parliamentary Returns, 1847.

† F. Royle cit, Review of Measures, &c., 1857.

CSL

Third cause of decline.

"This third cause may be described generally as "bad cultivation. It is evident from the inferior "condition in which the Cotton Wool of India "continues to be sent to the British market, that the interests of the "dealer and of the merchant are not identical with those of the manu-"facturer, or of Government. The object of the latter is to raise, and "bring into the market an article of such quality and at such cost, as "may stand in permanent competition with American Cotton. The "merchant and agent have no object in the transaction, but their imme-"diate profits in any one year: and if the inferior article yield him as "handsome, or even a better profit than a selected and better article "would do at a higher price, he will doubtless take it off the growers' "and native dealers' hands to any extent, and it is hopeless to look "for any permanent improvement under the system."*

This passage is quoted as suggesting the following considerations, and as summarising much of what has been cited under the head of the second cause of decline, as far as it relates to the cultivator.

If from all the evidence on record we seek to realize in imagination the position of the Indian villager in regard to Cotton, what shall we find it to be? This we believe, namely, that to bestow care and labor, skill and money, on the crop, would be simply to spend his money, devote his skill, and exercise his labor and care, on what he knows will be quite as profitable to him without any such outlay or trouble.

"The cultivator who will clean and tend his millet and wheatfield "will leave his Cotton plantation to take care of itself, gathering the "wool at the close of the season, when some of it has fallen and "been for days lying on the ground, some scarcely in a fit state "to be picked; neither can he understand that it is of any kind of

---

* Notes by Governor of Madras on the report of American Planters.

CSL

"importance that it should be otherwise, although he knows full well, "were he to pursue this course with his millet or wheat, he would be a "sufferer."[*]

In reality it actually *is* of no kind of importance to him that it should be otherwise.

We have already alluded to Colonel Skinner's Upland Georgia Cotton, and shall in another part of this volume give his detailed statements as to the cost and other conditions: the quality and out-turn were alike excellent, and he was very sanguine as to the success of his trial: we have seen that he abandoned it because the care and cost which the improved Cotton necessitated went unrecognized—common country Cotton sold as well. He acted as we presume any intelligent agriculturist would act under analogous circumstances, in England or elsewhere. The native cultivator does not make the costly experiment, but he fully appreciates the result. He does not grow his Cotton to suit the requirements of a distant English market, mythical to him, but he not unskilfully adapts the produce of his fields to the market where alone he can sell, and whose nature he thoroughly appreciates. His wheat is cared for, because if dirty, it would prove less remunerative; but why should he be so silly as to spend gratuitous labor on his Cotton? Is it reasonably pretended that his not doing so is any proof of his wanting skill, energy, perseverance, &c.? Whether he does or does not possess these valuable qualities, is of course a quite different question.

In this very brief review of the state of the Indian Cotton Trade much of the evidence adduced has reference rather to Bombay and Madras, than to Bengal, with which latter country alone we are directly concerned, but this is because on general subjects connected with Indian Cotton, inquiry has been naturally directed to those places where

---

[*] Mr. Shaw, Bom. C. S. F. Royle, cit.

CSL

the trade is of most importance, and thus comparatively little is recorded concerning the vast area of the Bengal Provinces. It is however believed that nothing inapplicable to this side of India is contained in the foregoing pages, and to appeal to the widest experience, and to those statements and opinions which carry with them the highest authority, was thought the best way of setting the question before the reader in its truest form, and at the same time in the strongest light.

Enough has, it is hoped, been said to show that the Cotton of Bengal, as well as that of every other part of India, after having been badly cultivated, carelessly picked, and injured in the cleaning, is fraudulently adulterated by the small dealers, the middlemen, and carriers, and that, finally, the shipper has either no interest in discriminating between qualities, or else no power to do so.

In short, such has been the state of the trade, that from the time the seed is dropt into the ground until the bale lies in the hold of the vessel, every one who has to do with it is either directly interested in deteriorating its quality, in those respects which are of greatest importance to the spinners, who are its ultimate consumers, or at least that all have interests antagonistic in a greater or less degree to its improvement.

The legitimate object of seeking to understand the true nature of the case is obviously to discover how abuses ought to be corrected—to find out, in short, how the reverse of what has been described, may be brought about. And to the evidence bearing on that point we shall now turn, without making any apology for passing over in silence a subject which would naturally have found its place here, if admitted at all, and on which a great deal has, on all sides, been recorded, namely, the distribution of the blame, and the question "who is in fault?"

CSL

It is evident that on the practicability of a radical change being effected turns the second subject, which has been proposed for discussion in this introduction, namely:—

2*nd.*—THE PROSPECTS OF THE TRADE, AND WHETHER INDIGENOUS COTTON CAN BE PROFITABLY CULTIVATED IN INDIA FOR THE ENGLISH MARKET?

In stating this question, I have taken the Indigenous Cotton alone into consideration, because doing so conveniently circumscribes the ground of discussion. The reader will find in the body of this volume all the best evidence extant on the subject of the practicability of profitably cultivating exotic varieties of Cotton, and will have an opportunity of judging how far the Lieutenant-Governor of Bengal is justified in believing that at least in regard to the cultivation of some sorts of long-stapled Cotton in Bengal, the question is mainly one of price.* As however the result is hypothetical, it was thought less liable to objection to take our stand on what seems justified by the evidence recorded, namely, that there are varieties of Cotton, indigenous to some of the Bengal Provinces, as well as to other parts of India, which, if fairly treated in culture, picked with ordinary care, allowed to reach the English market in their natural condition, and sent there in large quantities, would be used by the spinners for a very large proportion of their coarser work, as long as the good second-class American Cotton could not undersell them.

Few will deny that if a healthy and active trade on some such basis as this were capable of being initiated, the necessary result would be a certain, if not a sudden improvement in the quality of the aggregate of the raw material. By the birth of such a trade all those conditions would be altered which have hitherto resulted in its systematic debasement. All those who have hitherto found it their interest to lower the quality of the Cotton, would, under the influence of a healthy trade, seek to raise its standard, and we might perhaps find that the Indian villager, hitherto so often stigmatized as imbecile, because he does not grow Cotton at a loss to himself, might devote a skill which he is now assumed not to possess, to the production of any particular kind of staple which it became his interest to cultivate. He has been for generations under the baneful influence of the causes already described, and it would be unreasonable to suppose that a revolution in all his traditional prejudices will be rapidly accomplished. The history of agricultural improvement hardly justifies the expectation that any set of cultivators, in any country or age, would suddenly abandon habits ingrained by long experience, even when it is demonstrably their interest to do so: in regard to Cotton the experiment has never been tried on the much-reviled cultivators of Hindustan, and it remains to be seen whether they will be slower to appreciate their own true interests than the agricultural population of other places.

---

* Letter of Mr. Junior Secretary Gordon to Secretary Board of Revenue, 17th June 1861.

Bearing on this point I find the following evidence:—

Capabilities of the Indian cultivator.

Those who best know the agriculturist of India are also those who express themselves most hopefully on the subject, not only of his aptitude to learn, but also on that of his actual skill. Dr. Lush, who had for many years managed a Government experimental Cotton farm, more than once stated his opinion, that the Broach cultivator, with whom his duties had made him thoroughly acquainted, was quite independent of instruction from Englishmen: he was called to account for making the assertion by Mr. Bell,* but then the able Secretary of the Agricultural Society of India knew the Indian villager only at second hand.

Again, Mr. Bruce of Calpee, who both as a land-holder and as a Government servant, had had many years' practical acquaintance with agriculture in Bundelkhund, when he went to visit the Hummeerpore model farms, declared it to be his opinion that the crops sown by the American planters, after their costly methods of culture, were in no way superior to those sown in the neighbourhood by the villagers, to whom the same seed had been distributed: this was of course loudly denied by the planters themselves; but it is worthy of notice that an inspection of the accounts of these farms will show that as far as profit and loss is a test of success, the Cotton cultivation of the villagers was far before that of the planters.* Mr. Mercer, the most intelligent of these American planters, has recorded his opinion on the Cotton cultivation which he had an opportunity of inspecting in crossing India on his way to Bombay. He praises it highly, speaks of it in many places as "good" and "well managed," and in one place says that he observed "an approach to the American system of cultivation, and that ridging alone is wanted to make the parallel complete." That he should compare this Cotton cultivation to that of America, was a very high compliment from Mr. Mercer.

---

* See Transactions of Agricultural Society of India, Vol. VII.

A very strong kind of presumptive evidence in favor of the hope that the Indian villager may hereafter skilfully cultivate fine varieties of Cotton, when a healthy trade shall make it his interest to do so, may be found in the fact that in past times he certainly did it. The evidence on which this assertion rests may be referred to under the head of "Dacca," where Mr. Bebb's account of the Cotton cultivation in his time, will, I believe, be found satisfactorily to prove that considerable agricultural skill was devoted to the production of the finer kinds of Cotton in that district; also under "Benares," where Mr. Duncan's account of the same crop in his district shows what care was bestowed on it there: and again, under the head of "Chanderi,"

---

* It must be clearly understood that this and similar statements are quoted to show that the Indian villager *does*, under favorable conditions, develop agricultural skill, and not that his methods are either positively or relatively beyond improvement.

CSL

where certain statements are recorded, showing that great trouble was taken with the Cotton required by the manufacturers of that place.

Such seems to be the state of the evidence bearing on the agricultural capabilities of the class, who may some day grow Cotton for Lancashire: I shall now submit to the reader a few statements of opinion, selected from many recorded, on this subject, some favorable and some unfavorable to the view, that India is capable of supplying Cotton on a large scale for the English market.

Mr. J. Warden* thinks that one might improve to some extent the sort of Cotton which India produces, and also improve the mode of cleaning, and packing it; but the nature and kind of the Cotton could not be improved so as to make it compete with American Cotton, and that as to foreign seed, it always rapidly degenerated.

Major Windgate † thinks that under no system of management could India render England independent of America, and that even in quantity India could never turn out an amount capable of replacing the American crop.

Mr. J. P. Wise ‡ asserts that in Dacca, Cotton could now be profitably grown equal in quality to the best American, and at a price which would drive the latter from the market.

Mr. Freeman § believes that wherever any Cotton is now grown in small quantities throughout India, the crop might be indefinitely increased.

But of all those who have recorded their views on this subject, none seem to me to have so fully and ably treated it as Mr. Allen; ‖ he not

---

* Committee of the House of Commons, 1858. Questions 6179—6183.

† Ibid, Questions 7924, 7926.

‡ Ibid, Question 2679.

§ Ibid, Question 1930.

‖ Mr. Allen was at the time Collector of Mymensing, and the document quoted is a letter addressed to the Secretary to Revenue Board, accompanying statistical information called for in 1848, by Mr. Dunbar, Commissioner.

CSL

only sums up much that exists elsewhere in a desultory form, but advances reasons in support of his opinion. It is unfavorable to the expectation that India will ever become a source of Cotton supply. India, he tells us, is an old and populous country, rents are high, scientific agriculture is unknown, and skill, energy, and enterprise not to be found among the people: the produce of their industry is therefore less in quantity, and inferior in quality, to what it should be, and the cost of transport is high. India cannot then compete successfully with America, which offers a virgin soil rent free, and where the cultivation is carried on by hardy, energetic, and persevering men.

To this statement I have not met with any categorical reply; much of course has been advanced by those who hold an opposite opinion, and the following considerations have been collected from various sources and strung together for the convenience of the reader.

In the first place, when we speak of the Indian Cotton grower entering into competition with the American planter, it would rid the question at issue of much obscurity, and even of considerable ambiguity, clearly to state what the nature of that competition is, in what it consists. We know that it is the *recognized* interest of the American planter to produce Cotton of a certain quality, and to send it to market in a certain condition, and that to these objects he directs his most unwearied exertions. To produce this same particular quality of Cotton has not been the interest of the Indian villager, as we have, I trust, established a few pages back, nor does he suppose it to be his interest, and he has naturally never made any exertion whatever to do so: over the condition in which the Cotton which he does grow, may reach the market, or for what market it may be destined, he can exercise no control.

To speak then of competition as existing between the American planter and the Indian agriculturist, in the matter of *quality*, is simply

CSL

a misapplication of language, and leads to, or fosters, a confusion of ideas which it is absolutely necessary to clear away if we would fairly and impartially set the case in its true light.

If, keeping this in mind, we turn to Mr. Allen's statement, we shall find, that although all the disadvantages on which he dwells do undoubtedly exist, yet, as a matter of fact, Indian Cotton has been, can be, and perhaps is grown, and laid down at its distant port of shipment, at a price which it is notorious the American planter could not make a profit by, or, in other words, the Indian cotton-grower *has* successfully competed with the American planter, in the only thing in which competition can in any sense be asserted to exist, namely, cheapness.

The condition of the Indian Cotton Trade has powerfully discouraged the cultivator from entering on a competition in regard to quality: for reasons on which it would be irrelevant here to enter, it has been customary to assume that the Indian villager stood, in regard to his Cotton crop, in a position identical with that held by the American planter in regard to his; this assumption granted, it is no wonder that the skill, energy and perseverance of the latter should have been so long and loudly contrasted with the inertness of the former. The assumption is however gratuitous,—there is, I believe, ample evidence to prove that the position of the two producers, so far from being identical, or even similar, is not even analogous.

So far then as the evidence goes, it certainly warrants the assertion that past defeat need not be numbered among the discouragements to the hopes of the Indian Cotton Trade as to the possibility of competing with America in quality. On the other side, some encouragement may no doubt be derived from what we have on record as to the former success of Indian Cotton growers, when their efforts were directed to the production of certain fine varieties then in demand, and also from the praise which has been awarded to them, by some

GSL

of those best qualified to form an opinion on the merits of their methods of agriculture. And there is no doubt that the balance of this evidence will be pretty correctly estimated by those interested in the question:—the question, namely, whether Indian Cotton, indigenous or exotic, grown in large quantities, can be so far improved in quality within the necessary limits of price, as to compete successfully with the American, or whether the cost incurred in raising the standard of quality, will be found to exceed the corresponding advance in the value of the produce?

Reverting to Mr. Allen's estimate of the advantages of the American planter, it should not be forgotten, that although he has virgin soil for which he pays little or nothing, yet before his first crop is picked, a very large outlay must be made: his ground must be cleared, his slaves and farm cattle bought, expensive agricultural implements, costly buildings and machinery provided: interest on this money, wear and tear, food of his stock and of his slaves, and pay of his overseers, would seem so to enhance the cost of production, that the best calculations* have fixed at a minimum of 3½*d.* per lb. the actual value of the average crop before it leaves the farm, profits and cost of transport not included†—a sum which in all Cotton-producing districts throughout

---

* Parliamentary Returns, 1857.

† Just before the outbreak of the present American war, the highest English authorities on the Cotton Trade asserted that the general conditions of American Cotton cultivation were such as to warrant the belief that the limits of cheapness had been reached, and that an increase in price was the only change which could be reasonably expected. It should however be remembered by any one who makes the past prices of American Cotton an element in his calculations for India, that political changes *may* materially alter those conditions: that for instance a separation between the North and the Cotton-growing States would open the markets of Europe to the latter, and thus by relieving the planter of 30, or even 40 per cent. on the cost of all machinery, clothes and food, &c., for slaves, and many other things, which he now pays in the shape of protective duties to the States of the North, greatly reduce his outlay, and *possibly* enable him to reduce his prices.

CSL

India, would unquestionably leave a fair margin for an increased outlay on the amelioration of the quality of the present crop.

Lastly, Mr. Allen mentions the great facilities of transport enjoyed by the American planter: but it may be remarked that these facilities did not exist in anticipation of the Cotton Trade of the United States, but that on the contrary steamers multiplied as a result of that trade.

The natural advantages of the American Cotton fields are no doubt great, but those of many of the best Cotton-producing districts of the Bengal Provinces are by no means contemptible, nor is it unreasonable to conjecture that, should a demand for cheap carriage ever arise here, similar to that which has produced the American river steamers, it might perhaps be as successfully met, allowance being made for special conditions in each case. The skill, energy, and hardy perseverance to which Mr. Allen so justly lays claim for the American, are not unknown among the British settlers in the East.

Mr. Landon* states, that using the American saw gin, and purchasing the Cotton in seed, from the cultivators, without bestowing any care on the culture, his ginned Cotton commanded a higher price both in the Bombay and in the English market than its competitors.

There is then a course open to the Cotton trader which leads to definite results, however small these may now be: this course has been entered on; in proportion as it is intelligently pursued, its natural results will be developed; the causes which have hitherto had so baneful an effect will be replaced by other and antagonistic causes, whose necessary effects will be amelioration; in direct proportion to the activity of the causes will be the extent of the results produced, and it is not perhaps unwarranted by a fair review of all the evidence on record to assert that the prospect is hopeful.

---

* Parliamentary Committee of 1858, anti. cit. Question 8339.

CSL

We are thus naturally led to consider

3rd.—SOME OF THE DIFFICULTIES WHICH HAVE BEEN SUPPOSED TO IMPEDE THE PROFITABLE CULTIVATION OF COTTON, AND ITS COMMERCE IN INDIA.

Intimately mixed up with almost every portion of the records of which this volume professes to offer a summary, there exist complaints against various difficulties and obstacles, mostly accompanied by confident assertions, to the effect that the removal of what was in each case animadverted upon, would certainly be followed by sudden and striking results.

The impression which must be strongest on the mind of any one studying this subject in the light of subsequent experience is, that these predictions have been almost invariably falsified by the event.

The extent to which this statement might be illustrated by example is embarrassing. The Ganges Canal, however, may furnish a fair instance. Many assertions were made to the effect that as soon as this canal should have been opened to any considerable length, Cotton would be obtainable along its banks to an unlimited extent. This increase of Cotton cultivation was to have been one of the most prominent results, if not the most prominent result, of the increased facilities of irrigation. I have no means of ascertaining accurately how the relation between the different crops within the influence of the Ganges Canal has been affected by the advent of its water supply: but this at all events is certain; namely, that the promised results as to Cotton have not even remotely been realized, if indeed any relative increase of the crops has been effected: in presence of a fact of this kind, it is not easy to form a fair estimate of the value of complaints now made, alleging that the want of irrigating power elsewhere forms an obstacle to the spread of Cotton cultivation, as for instance has lately occurred in the case of the Jullundur Doab, and, indeed, of many other parts of India. When the

6883 CENTRAL SECRETARIAT LIBRARY GOVT OF INDIA

CSL

subject of the irrigation of Cotton is theoretically discussed, the form which the question generally assumes is, whether or not the crop can pay the expenses of irrigation? When a practical solution presents itself, it comes in a different form, as thus :—given the water supply, will Cotton pay better than any thing else to which the new advantage can be turned? and obviously as long as other crops do pay better, it cannot be for the general good that Cotton should be grown.

The possibility of growing, by the aid of irrigation, Cotton of an improved quality, affects the latter question in a way almost too palpable to need mention :—thus, it is certainly good husbandry to grow sugar on an acre of irrigable land, which would yield, if sown with Cotton, 100 lbs., worth 1¼*d.* per lb.; but the question would be radically altered if the acre yielded 400 lbs., worth 2¾*d.* or 3*d.* per lb.

Again, there can be no more doubt that improved means of transport would be a great gain to the country, than that a great extension of canals of irrigation would be desirable; the question for us is, whether we are at liberty to conclude that were any given road constructed, Cotton, rather than something else, would be carried along it? because, if this cannot be rendered fairly probable, the absence of this road ought not to be set down as an obstacle to the increased cultivation of Cotton, so long as other branches of agriculture flourish in spite of the want. On the other hand, even although it be not admissible to conclude that certainly any new canal, or any new road, will materially increase the available supply of Cotton, yet there is always room to hope that such may be the case, and it is certain that the bulky nature of Cotton renders it far more dependent on cheap transport than many other kinds of agricultural produce.

Precisely similar observations apply to the question of land tenure, which was long asserted by many, to be an obstacle of the most fatal kind to any increase in the cultivation of Cotton: here as elsewhere, radical and most important changes have taken place, but it remains to be proved that the results, as regards Cotton, were correctly anticipated.

Enough, it is hoped, has now been advanced to show that to whatever extent the absence of irrigation works, the paucity of roads, the nature of the land tenure, &c., were obstacles in the way of the healthy growth of the Cotton Trade, these were all secondary influences, and of minor importance compared to those inherent evils which would have stunted the growth of the trade, no matter how favorable all extraneous circumstances might have been.

In conclusion, I would express a hope that the analysis of evidence presented in this introductory chapter will be found, if brief, at least clear and impartial. Some of the matter discussed, being still subject of controversy, would have been passed over in silence, had such a course been thought consistent with the object of the compilation, which is to furnish an abstract of all the evidence on record, which directly concerns the question of Cotton cultivation in India; and the reader has not been left without ample materials from which he may judge for himself whether or not the conclusions suggested be warranted by the evidence adduced.

PART I.

Section I.

LOWER PROVINCES OF BENGAL.

A PERSON proposing to obtain, concerning any country, information which should throw light on its capabilities for producing some particular commodity, would, I presume, first of all enquire into those general physical conditions, on the correct appreciation of which his ultimate success must always, in a great measure, depend.

General aspect of Bengal.

If we approach our subject from this point of view, and consider Bengal as including the vast area extending from the southern extremity of the Arracan territory, to the north-east frontier of Upper Assam, thence to the boundary of Goruckpore, and southwards to the northern limits of the country of the Northen Sircars, we shall find that in reference to its Cotton producing capabilities it may conveniently be divided into three portions, each of which presents to the agriculturist certain natural peculiarities clearly definable, sometimes even strongly contrasted, and always of primary importance to him.

Detailed information not available.

Before proceeding to indicate these divisions, I must remind the reader that the sources from which the information contained in this volume is derived, can lay claim neither to the depth attainable by scientific research, nor to the copiousness which systematic investigation would have ensured: we have instead, a vast accumulation of desultory observations, which, although often very

CSL

interesting in themselves, and often suggestive of the most important conclusions, most frequently only show, to quote the words of Dr. Royle, " How little attention has been paid, or at least how little " information is given us respecting the attention that was paid, to " all the points essential to ensure success in culture, and improve-" ment in produce. Also how seldom any attempts are made, or " reasons given, to explain the cause of failure. We find, as was to " be expected, equal inattention to, if not ignorance of, the princi-" ples. The majority also appear wise only after personal experience, " and paying little attention to that of their predecessors. For " we find that the same course is followed, the same results are obtained, " and continue to be announced as new, although we have had " them on record for a series of years."*

It is then obvious that if such be the nature of our materials, we must content ourselves with a very superficial view of such a question as the physical aspect of the country.

The three fold division above spoken of is on this wise :—

The Seaboard.
The Alluvial Flat.
The Uplands.

And we shall now place before the reader a short sketch of each in turn.

1*st.*—THE SEABOARD.

From Cape Negrais on the south-east, all round the head of the Bay of Bengal to below Point Palmyras on the south-west, a band of country, of a width not accurately definable, stretches along the coast, characterised as a whole by peculiarities of soil, climate, &c., which serve to render it distinct from the inland country beyond, and which, in

---

* D. F. Royle, Culture and Commerce of Cotton in India, page 92.

CSL

reference to their influence on the growth of the Cotton plant, all reasonable analogy teaches us to regard as of the most vital importance.

After what has been premised on the subject of the incompleteness of our information, it may perhaps be thought needless to point out that it is only in the very roughest kind of classification that the sand hills of Hidgelee and Orissa, and the mangrove swamps of the Soonderbunds could be found grouped together, and along with the rocky shores of part of Arracan—a better arrangement is however beyond our reach: we know also, that however great the variety which exists, and however widely different the conditions which obtain within this seaboard tract, any two of its most strongly contrasted localities still have something in common which, while it serves as a connecting link between them, furnishes at the same time fair reasons for considering them as distinct from the rest of the country: peculiarities of climate due to a common position near the sea, forms a very important element in such resemblances, and the presence of certain ingredients in their soil, traceable to the same fact, is also important.

Of this seaboard area, taken as a whole, very little seems to be known; very little information has at least been found recorded. Some few details will be found under the head of the districts which include portions of it, especially where any experiments in Cotton-growing have been instituted: but even of these experiments we know little: only a very few appear to have been made, and the accounts of these are very meagre. Opinions have indeed been very strongly expressed by many persons, and many considerations advanced *à priori*, in favor of different parts of the Bengal seaboard as Cotton-growing districts: it has been argued that among the many varieties of site included within this tract, some localities will certainly be found, sufficiently like in general conditions, to those somewhat similarly situated districts in America, where the finest Cotton is grown, to warrant a reasonable expectation that fine Cotton might be grown here also.

CSL

A comparison of what is actually recorded relative to the experiments made, with such *à priori* considerations, leaves the impression, that as less is absolutely known of the capabilities of this area, so more is asserted of its possible advantages: the inverse being of course equally true, namely, that in proportion to the brilliancy of the prospects which are sometimes held out, is the obscurity of the darkness which still hides the path towards fruition.

Land is however stated to be easily obtained, cheap, and abundant: labor is asserted to be not a greater difficulty here than it would prove in some of the best of the upland jungul districts: no roads are required, water-carriage being everywhere at hand: the cost of transporting the crop to the ship's side would be so slight as to make no appreciable difference in its price: in short, it may be considered as more than probable that a moderately successful cultivation would suffice to realize considerable profits here.

Meanwhile the test of actual trial, on a scale calculated to ensure positive results, still remains to be applied.

2nd.—THE ALLUVIAL FLAT.

Lying between the seaboard on the one hand, and the uplands on the other, and rendered distinct from each by many characteristic peculiarities, lies the great alluvial flat of Bengal. Monotonous as the sameness of its dead level at first sight appears to the eye, there are, without doubt, included within its limits, certain varieties of soil, climate, and general physical characters, which must in practice be of great importance to the agriculturist. It is of course quite beyond our power to offer a very satisfactory account of even the most prominent of these: but there is one physical fact which is of considerable interest and importance in connection with this great area, and which is at the same time so easily recognised, and so often influences the result of

GSL

experiments and observations, that some notice must be taken of it.

If we consider the alluvium to lie, as above stated, between the seaboard and the uplands, these limits will be found to include two distinct geological formations: one of these is an older alluvium, supposed by those whose opinion is best worth having, to be of marine origin: it covered the area, which is now Bengal, at a time when the sea washed the lower slopes of the Himalayas: as the ground rose, the Ganges from the west, and the Bramaputra from the east, cut channels through its clays and sands: and as the elevatory process went on, they washed away much of those clays and sands in some places, while in others they spread over them other clays and sands carried down by their own waters, and deposited wherever the velocity of their currents was checked: forming, in fact, the commencement of their united delta, which still continues to grow southward, by the very same kind of action: the whole of the older alluvium was not covered by the newer one, patches of it remain exposed, some of these lie like islands surrounded on all sides by the newer clays, some stretch like promontories far out into the area of the true delta, while the clays, &c., of the delta, form bays and creeks among the irregular undulations of the more ancient deposit.

Now the soils of which each of these formations consists, differ from each other as a rule, both in their mechanical and chemical features: but into such matters we have no means of enquiring, and cannot therefore go farther than the statement that such differences not only exist, but exercise an influence whose power will be best appreciated, when we come to see how curiously the physical boundaries, which separate the older and newer alluvia, coincide with others traced to represent agricultural statistics.

I shall here offer only one illustration of this: the Moorshedabad District is stated to grow no Cotton, save only in one small portion

CSL

of its area, near a place called Noorye: now this Cotton cultivation is carried on thus exclusively, on a patch of the old alluvium, isolated, or nearly so, amidst the surrounding expanse of the delta clays.

Thus then it will be found convenient in studying the detailed information which we possess on the subject of Cotton cultivation in Bengal, to bear in mind, that within what, following the general practice, we shall speak of as the alluvial area, there are really included tracts of country, each differing from the other in some radically important points: doing so will at least offer the advantage of systematizing, to some small extent, our knowledge, and tracing to natural causes what would otherwise be left as isolated anomalies.

First among the advantages which the area of the Bengal alluvial flat, as above defined, offers as a source of Cotton for exportation, may fairly be ranked the facilities of water-carriage: many complaints have, no doubt, been made on this head, but the general tendency of all that has been recorded on the subject will certainly be found to show, that for portions of this area, those facilities are very considerable indeed: while almost every part of it contrasts favorably in this respect with the upland country beyond, and that relatively at least, it enjoys a great advantage in this way.

Labor is also stated to be almost every where abundant, and for the most part cheap.

The great and well-known fertility of the whole, and the probable fitness of many, although not perhaps of most parts of it, for the production of fine Cotton, are also among the attractions which it presents.

The difficulties seem to consist principally in the fact that the Cotton crop, as now cultivated, is out of favor; that other crops pay better, and cannot therefore be readily displaced, even were the former to become more remunerative.

It is of course obvious, that if we exclude the case of the European planter, who might grow Cotton on his own lands by paid labor, the

CSL

success of the crop, as an article of general produce throughout the country, will not turn only on the question as to whether it can be grown so as to pay its expenses, and yield a profit, but also on the extent to which it can be made to yield a better profit than other crops now in cultivation.

The evidence which we possess on this very important subject will be seen to consist, for the most part, of expressions of opinion: these every one will of course weigh for himself, as they are quoted hereafter in detail: meanwhile it may be here stated, that the balance seems to incline against success within the area of the newer alluvium, whilst regarding that of the older, many favorable opinions and sanguine hopes have been recorded.

3rd.—THE UPLANDS.

Within the limits of the Lower Provinces of Bengal there are immense areas occupied by undulating ground, often of great fertility, sometimes mountainous, and always more thinly populated than the flat country of the alluvium below. These uplands include a vast variety of soils, mechanically and chemically considered: greater probably than either the seaboard or the alluvial areas: they likewise offer a more extensive field of selection as to many other conditions on which the success of the agriculturist materially depends. In most of its aspects this upland area is physically very distinct from other parts of the Bengal Territories, and its boundaries are very sharply defined; they run all round the valley of the Ganges, enclosing the Bengal plains on three sides.

Approaching the sea at the extreme south of Arracan, a range of hills runs from thence northwards, and is continuous all along the coast to the Tipperah country. A great bay, in the upper portion of which lies the Sylhet District, is bounded on the south and east by the continuation of the same mass of high ground, which again to

GSL

the north of this bay forms the highlands of the Kooki, Khasi, and Garrow Country: the valley of the Bramaputra is bounded on the south side by the northern slope of these same hills, while opposite to them, on its north side, commence the lower spurs of the Himalayan Range: if we pass westward, along the Terai, until we reach the fiscal boundary between the Upper and Lower Provinces of Bengal, and thence follow that boundary, it will lead us south, across the Ganges Valley, to the foot of the lower slopes of the Bhaghelkund plateau, in the Sasseram District: hence the uplands skirt round the lower valley of the Soane, touch the Ganges at Monghyr, form a bay between that point and the north-eastern headlands of the Rajmuhal Hills, from which place their line of junction with the alluvial flat trends to the west of south, approaches the sea again near Balasore, and running parallel to the coast, passes out of the Bengal country at the southern end of the Pooree District.

We have the fullest evidence that from time immemorial all the lower portions at least of this upland area have grown and exported Cotton: this Cotton was, and still is, rapidly absorbed among the adjacent lowland bazars, seldom reaching the great marts on the Ganges: and I find no record of its ever appearing in the Calcutta market: the descriptions given of the methods of cultivation in Arracan and Chittagong are, as will be seen, nearly identical with those recorded of the Kooki in Cachar, the Naga in Assam, the Dhimal in the Darjeeling Morung, and the Santal in Palamow and Maunbhoom.*

Much of the upland part of Bengal is absolute jungul, a considerable portion of which could not be brought under cultivation, but vast tracts are stated to be of the finest soil, and greatest natural capabilities, although now waste: there are rocky hills, with narrow gorges and ravines, along the swampy bottom land of which the jungul people

---

* The same remark applies to the rising grounds of the Irrawaddi Valley, and southward along the hills of the Tenasserim Provinces.

CSL

raise their scanty crops, and there are wide plains, and great flat valleys, where the rich soil is here and there made to rival the productiveness of the Gangetic alluvium.

Generally considered, the uplands present many attractions to those anxious to obtain a supply of Cotton for exportation: land, such as all the evidence available tends to prove well suited to produce fine kinds of Cotton, is cheap, and endlessly abundant: labor, in some places, if scarce, is available, and might be attracted without much difficulty: in others its want would constitute a very serious obstacle: as a rule, the means of transport would also be found insufficient; some of the most promising Cotton lands lie in remote and thinly peopled districts, where the only road hitherto needed is a track along which a loaded buffalo could walk. The upland area includes, however, districts so similar in some respects, while in others they are utterly unlike, that, as stated, there is an exceedingly wide field for choice: for instance, in the Rajmuhal Hills, the proximity of the Ganges on the north, and of the railway on the north and east, leaves nothing to be desired as to means of conveyance but a few short roads, some of which actually exist: while in Palamow and Sirguja, the great distance to which the Cotton would have to be carried, in some cases through forests and over hills, before it could be placed on even an ordinary cart road, would of course be equivalent to a heavy tax on its value: again, as to population, in Behar generally the difficulty of want of labor will not present itself, but much of the best land will be found pre-occupied, while in Chota Nagpore and Chittagong, the widest choice of the most desirable land is stated to be at the disposal of the planter, but men to till it are not always to be found.

Some Physical Conditions considered more in detail.

In arranging the multiform information of which this Hand-book professes to be a digest, it was thought that, to facilitate reference, and

CSL

place all the knowledge we possess within the grasp of any one who might seek to use it, the most efficient plan would be a topographical classification; this has accordingly been adopted, and fiscal, not physical, boundaries have been followed. As we have already stated, the nature of the available materials would not, indeed, admit of the more rational and scientific arrangement.

To render such treatment possible, we must have had far more detail than we possess; under the word climate, for instance, so much is included, the amount of heat and moisture (cold and dryness) and their distribution, and this considered in its relation to other things: to the height of a place above the sea level: to the flat, undulating, or hilly character of the ground: to the aspect or exposure, as sloping towards a particular point of the compass: again an entirely new series of conditions is added to the already complicated problem, when we come to deal with the nature of the soil: first its mechanical character, whether tenacious, or porous, and pervious, homogeneous or mixed, whether pure clay, or sand, &c.: and then its chemical nature, as calcareous, or argillaceous, or silicious: and, besides such leading and prominent features, what other bases, and what acids enter into its composition, in the form of what salts they appear, and in what relative proportions.

Now it is needless to say that although all the more searching and detailed questions of this nature—while matters of every-day practical application where agriculture has become a science—are quite beyond the reach of those interested in Cotton cultivation in Bengal, yet some at least of the more simple combinations of the phenomena alluded to, must nevertheless necessarily be taken into account by any one who desires to do full justice to an experiment.

When we remember the high reputation for scientific acumen, for practical knowledge, and for general ability, of many of those, who, in the pages of the publications of the Agricultural Society of India, as well as in an official form, have recorded the past history of Cotton

CSL

cultivation in Bengal, it is strange to find Dr. F. Royle in 1857 saying that "little information is given as respecting all the "points essential to secure success in culture, and improvement in "produce."*

It is perhaps stranger still to see, that when in 1860-61 a distribution of exotic seeds was made throughout Hindustan, the process of assigning different varieties to different localities was as tentative as a similar operation had been thirty or forty years before: and to observe that in the last recorded experiments, varieties of Cotton, so well known to differ in their climatal and other requirements, as Sea Island, Upland Georgia, and New Orleans are being tried side by side in the salt swamps of the Soonderbunds, and at the same time on the arid sands of the Punjab. Much information, carefully collected, has been faithfully recorded: but it was in the form of desultory experiment and observation, not the result of systematic investigation, and thus it is now impossible to utilize it in a systematic manner.

A single illustration of what is meant may not be out of place. At Midnapore, at least two experiments on the cultivation of exotic Cotton are recorded: one was, as far as the narrative conducts us, comparatively successful, the other a complete failure. Now this station stands just on the boundary between the Gangetic alluvium and the upland area: the line of demarcation between the undulating and the flat country is here sharply defined, and the agricultural aspect of the two areas strongly contrasted; so strongly indeed, that a line so drawn as to include all the rice cultivation, would be here a geological boundary: yet in describing the experiments alluded to above, it is no where stated whether the alluvial or the upland ground was tried, a condition, it need scarcely be added, of the most vital importance: the difference in the result *may* have been due to it alone: all we hear at all suggestive on this head is, that in one case the soil was "light and sandy;"

---

* The passage in extenso is cited a few pages back.

MINISTRY OF CULTURE · GOVERNMENT OF INDIA

GSL

whether it was so in the other, is not stated: but it would be difficult to hit on a mode of expression less likely to give a clue, for soils which might be correctly described as "light and sandy" abound within both areas.

The Map.

As above stated, fiscal not physical boundaries are taken as our basis of arrangement, and the map is an attempt to display, in the form of a diagram, the facts on record in connection with the distribution of Cotton cultivation, and its consumption, throughout the Bengal Provinces.

Of the eleven Commissioners' divisions within the Lower Provinces, five are stated to grow no Cotton, namely, Rajshaye, Nuddea, Burdwan, Chittagong, and Arracan, and six to grow it to a certain extent for local consumption, namely, Patna, Bhaugulpore, Dacca, Assam, Chota Nagpore, and Cuttack.* This has, after some hesitation, been taken as the safest plan of arrangement, and the map shows three tints intended to convey to the eye an impression consistent, if not commensurate, with the true state of the case. The whole of the area colored pale pink, as well as that colored green, imports Cotton, and every part of it likewise grows it to some extent; but the Lieutenant-Governor of Bengal was, I presume, guided, in classifying the eleven divisions as above, by the general tendency of the evidence before him. I have used as a test question for distinguishing between the *importing* and partly *self-supplying* areas, this: *is the locally-grown Cotton found for sale in the bazars?* Thus, the districts for which I can find no trace of the locally-grown Cotton among records of bazar prices, and the like, and which the Revenue Officers state to grow little or none, are considered as simply importing districts, and are colored green: those colored

---

* See letter from Mr. Secretary Gordon to Revenue Board, 17th June 1861.

CSL

pale pink form the other class, namely, that including those districts in which, although Cotton be imported, some of that locally-grown is to be found for sale, if not in the great marts, at least in the minor bazars: and where the price of the Cotton of the district is referred to in the returns of the Revenue Officers. Thus the map, although it conveys but incomplete information, is not calculated to mislead, save only as to the *extent* to which a district may be self-supporting. In one respect only I have departed from the plan of the above classification: instead of taking the Commissioners' divisions, I have distributed the colors according to the Collectors' districts: some of the inconsistencies and contradictions certain to result from an attempt at classifying according to fiscal boundaries, facts due to the action of physical causes,—or at least powerfully influenced by such causes,—have been thus evaded: for instance the Dacca Division is set down in the partially self-supporting class; but within it, the districts of Cachar and Jynteah, export; while in Jelalpore and Backergunge districts so little Cotton is grown or sold, that they may be placed in the non-producing class, without violating any probabilities: and thus in several other cases. Obviously had it been practicable to make use of some still smaller sub-divisions of area, the same process of eliminating discrepancies would have been carried still further, and the coincidence of the statistics of Cotton cultivation, with certain physical facts, been rendered still more apparent. For instance, this boundary between the upland and alluvial are as runs through the districts of Burdwan, Bankoora, and Beerbhoom; had it been practicable to show on the map the villages which grow Cotton, and those which do not, the closeness with which the limits of the simply importing (as distinguishable from the also partially self-supporting) area, coincide with those of the new alluvium, would have been much more clearly perceptible than it can now be made: it would also have then appeared how such districts as Sylhet and Mymensing gain their

CSL

rank in the self-supporting area, in right of certain portions of each, where Cotton is grown, above the general level of the Gangetic delta.*

It will hereafter be seen that there is one case in which the general conclusions suggested by the above considerations do not apply in practice: for we are assured, on competent authority, that in parts of the Dacca District, Cotton of excellent quality can be, and has been, profitably grown, not only within the limits of the true Gangetic alluvium, but on lands actually subject to annual inundation.

Evidence on the General Question of Profitable Production.

Bengal does not grow enough Cotton for her local consumption.

Every one who has seriously considered the practicability of exporting Bengal-grown Cotton is of course well aware that the Province does not produce nearly enough for its own consumption: that besides very considerable quantities sent into the plains by the upland country, in spite of the large quantities of English spun yarn, and of European Cotton cloths which it now absorbs, extensive supplies of raw Cotton continue to be annually drawn from the North-West Provinces, and from Central India, for its use.

Has always imported.

The oldest record of the Indian Cotton trade to which I have had access, is contained in one of those volumes of the ancient archives of Government now in course of analysis by Commissioners lately appointed for that duty: it was kindly shown to me by the Secretary of the Commission.

In October 1755, there is an entry of the sum of Rupees 51,190

---

* The assertion that these facts would have been apparent rests principally on the statements of the Revenue Officers, who (as will be seen in detail hereafter) speak of the Cotton of these districts as always grown on the higher grounds.

GSL

stated to be due to the Bombay authorities for 1,045 bales of Cotton shipped from that port, for Calcutta, some time previously.

In November of the same year 1,044 of these bales were sold here by public auction : the report of this sale is very puzzling. One of the bales has disappeared from the account : the "invoice price" is given as Rupees 11-15-6, but *per* what quantity is not stated : it can't be per bale, as the sum thus obtained would only amount to Rupees 12,508-9-0 : it probably referred to mans, as will hereafter be shown : the bales were disposed of in 42 lots, mostly of 25 bales each, and the name of the purchaser of each lot is set down opposite to it in the list : a sum is also written down opposite each lot, which, evidence to be referred to hereafter, shows to be the rate per man, though this is not stated in the document itself, nor is any total sum inserted : in short, from this list, nothing definite regarding the price can be deduced.

In a treasury abstract for the following December, an entry however appears, which affords ample means for clearing up the obscurity : a Mr. Paul Pearkes has paid in the sum of Rupees 7,599-8-0, being for 227 mans 11 seers of Cotton, purchased at the November sale : referring back to the sale list first mentioned, we find that Mr. Paul Pearkes bought one lot of 25 bales, at Rupees 33-7-0 *per* something not stated : the above figures show that it was per man : and thus we find that 25 bales = 227 mans 11 seers, which at Rupees 33-7-0 per man cost him Rupees 7,599-8-0 : taking the man and seer at their present value, and the Rupee at two shillings, we find the following general values. The original 1,045 bales weighed 727·28 lbs. each, or probably averaged about this weight, which is a little below that of the Bombay candy : as shipped at Bombay for Rupees 51,190, the price was 1·63*d.* per lb. : at Rupees 11-15-6 per man, stated to be invoice price, they cost, as landed in Calcutta, Rupees 91,309 : the sum of Rupees 40,159, which is the difference between that charged at Bombay, and that

CSL

derived from the invoice price, must, I presume, have been for shipping and landing charges, and for freight: if this conjecture be correct, the Cotton cost in Calcutta 3·59*d.* per lb.

Mr. Pearkes purchased his lot a little under the average of sale, so that we are safe in applying his rate to the aggregate: doing so, we find that the gross receipts amounted to Rupees 317·370, and that the Cotton sold for 10·03*d.* per lb.

If the total cost of the Cotton, as landed in Calcutta, was only Rupees 51,150, as would at first appear from an inspection of the account, the net profit was Rupees 2,66,220, or 520 per cent. on the outlay: whereas, if the hint furnished by the mention of this Rupees 11-15-6 as invoice price, has been correctly applied, the outlay was Rupees 91,309, and the profit Rupees 2,26,061, or only 442 per cent.

It is not impossible that this isolated fact may afford very fallacious indications of the average value of Cotton in those times: the volume quoted contains indeed many complaints made by the Commercial Residents in the interior of the badness of the season for Cotton, and in the "consultation" of the 9th June of this year, 1755, a letter from the gomashta of Hurripal is recorded, in which he states that his "weavers having tried the market price of Cotton, say that it is sold "at Rupees 5-0-6 per cutcha seer." Five shillings and three farthings per lb. is a fabulous price, but if an error in copying be supposed to have transferred the 5 from the place of annas to that of Rupees, we should have the Hurripal price as 4·12*d.* per lb. Whether the Cotton purchased at 10*d.* per lb. in Calcutta was destined for the Cotton manufactures of the interior, we can only conjecture.

"A Summary Report on the Cotton Trade," dated Fort William 1802,* reviews the course of events for some years previous to that date: it states that for several years anterior to 1790 the price of Broach and Surat Cotton had frequently sunk to Rupees 95, or even

---

* Reports on Cotton Wool, &c., 1836.

Rupees 80 per candy (2·44*d.* and 2·90*d.* per lb.), and that whenever this was the case it had been imported into Bengal.

The quantity of Cotton annually brought down the Ganges is stated to have averaged, for many years, up to 1802, 490,000 mans: of which 180,000 mans were supposed to be the produce of the Deccan, and 270,000 mans to have come from Bundelkhund. Benares was included in these returns, and that district is supposed to have absorbed 40,000 mans of the total quantity. As regards the Guzerat Cotton, both its price, and the quantities available for Bengal, are stated to have been dependent on the China demand: and small exports of the Up-country and Bengal-grown Cotton sometimes took place when the supply of the former was in excess of the above mentioned quantity: the price, we are told, had long ranged a little under Rupees 9 per man of 96 lbs., or 2·14*d.* per lb.

The quantities imported from all sources is stated to have equalled seven-eighths of the total consumption. Thus we find that Bengal grew only one-eighth of the Cotton she required, at a time when her manufactures were still in full activity, if not at the height of their prosperity; and under the stimulating influence which that trade must have exerted on the production of the raw material.

Aggregate amount of Cotton grown not materially decreased.

It seems, by no means an improbable conjecture, that the influence of the manufacturing trade was but local even in its best days, and that the effect which its withdrawal had on the aggregate Cotton crop of Bengal has been often greatly exaggerated.

It cannot of course be denied that at this time Cotton for the finest kinds of fabrics was largely grown in the Dacca District, and that this Cotton is no longer cultivated: indeed, with regard to that and perhaps one or two other districts, there can be no doubt but that the total cultivation of Cotton has declined. We cannot now discover, with

GSL

even a remote approach to accuracy, what proportion of the ground under cultivation in Bengal grew Cotton in the year 1790 : but the impression left by all the facts stated, and opinions expressed relative to the subject, then and since, will, I think, be found to suggest the belief that this proportion has not materially altered in the aggregate. If, instead of the time of the prosperity of the manufacturing trade, we take the period of its decline, it will certainly appear that there is no reason to suppose any diminution of the Cotton crop, relatively to the aggregate area of cultivation has taken place within the last forty-five or fifty years : all the records to which I have had access relating to this period, have described the Cotton cultivation as carried on for local purposes only, and that, in the most limited sense of the term, for it seldom appeared for sale even in the village bazars, but was spun by its actual growers, and served to clothe them and their families, after being worked up by the nearest weaver. Precisely the same state of things now obtains.

Soil and climate not unfavorable.

At the same time it nowhere appears that the small extent to which Cotton was, and is grown, can be traced to any peculiarities of soil or climate which might render them unsuited to the crop : on the contrary, evidence abounds in favor of the statement that Cotton has been, can be, and is grown in Bengal, of a quality excellent relatively at least to the produce of other parts of India : it is certain for instance, that when Bundelkhund Cotton (as in 1790) sold at a little more than 2*d.* per lb., and Surat a little above 2½*d.* per lb., that grown on the banks of the Megna fetched more than 3*d.*[*] Moreover, to this day we are told that whenever Cotton grown within the district meets that of the North-West Provinces in the Bengal marts, it invariably commands a higher price : it is also stated on good authority,[†]

---

[*] See Mr. Bebb's statements under the head of "Dacca."

[†] Among others by Mr. T. A. Wise, *Agricultural Journal*, 1861.

GSL

that the Bengal cultivator prefers (even although it costs him more) the cloth made from the produce of his field, spun in his house, and woven in his village to all others: that which ranks next in his estimation being manufactured by the neighboring weaver from imported yarn; while its greater cheapness is his sole inducement ever to use the manufacture of Europe.

Other facts which might have stimulated the production of Cotton in Bengal.

Besides the above considerations, there are others which were certainly calculated to stimulate the extension of Cotton cultivation in Bengal. An inspection of the tables which will be found at the end of this chapter, shows that the average out-turn per acre is very much higher for the crop here than in the Cotton-growing districts of the North-West Provinces and Bundelkhund: and thus, although Bengal-grown Cotton actually sells at a better price than that brought down the Ganges, and although the yield per acre is much larger, still the crop is out of favor, and does not materially increase.

Again, Mr. Secretary Rivers Thompson, writing in May 1861, says:—" It is satisfactorily established that large tracts of land suited " to the cultivation of Cotton are available in almost every district " under the Bengal Government, and in some of these districts the " facilities of transport by water are very great." With regard to the last statement, it is, at all events, indisputable, that in the matter of the cost incurred in conveying the crop to the port of shipment, the Lower Provinces have a most decided advantage over the Cotton-growing countries to the west and north-west.

All these circumstances, the advantages of water-carriage, greater production to area, and greater, or at least equal value of the crop, when produced, considered *à priori*, would lead to the conclusion that the Lower Provinces ought to have been at least self-supporting in regard to Cotton, and certainly ought not to have imported it from

CSL

countries inferior to themselves in so many particulars directly bearing on the relative cost of production.

Suggested explanation and its application to the future prospects of the trade.

Nevertheless, it has not been so; and I am not aware of any reason having been assigned in explanation, other than the very obvious one that the ground is otherwise more profitably employed by its cultivators: that it is cheaper for the Bengal villager to buy worse Cotton than he could grow, than it would be for him to grow better Cotton than he can purchase.

It is evident that the Lieutenant-Governor of Bengal assumed something like this to be the true state of the case, when, in reviewing the recent correspondence relating to the possibility of obtaining Cotton for the English market, from the Provinces under his Government, he states his belief that "an indefinite rise of price would draw from "them an unlimited supply of Indian short-staple Cotton, whilst none "can be expected from them for export at, or about, present prices."

The purely retrospective character of this work places beyond its legitimate limits the discussion of the possible effects which prices much higher than those now ruling the market, might have on the cultivation of Cotton in Bengal: inasmuch as the past history of the subject offers no fairly analogous example, from an analysis of all the circumstances connected with which, a lesson might be drawn.

The view suggested by the past history of the trade.

That history does, however, as might have been anticipated, offer suggestions, which any one proposing to obtain from Bengal a steadily permanent supply of Cotton for the English market, would I presume desire carefully to weigh: some of them are accordingly presented here.

The balance of the evidence before us, and the confident assertions of many who have had the best opportunities of forming a correct opinion, agree in establishing the probability that Bengal could produce

CSL

Cotton for exportation to almost any desired extent; and of a quality which would, under favorable conditions, adapt itself to the requirements of the English market: it will scarcely be questioned that the fact of the ground being more profitably employed in raising other crops is, as above stated, a very sufficient reason for the neglect of this one: I cannot appeal to any direct evidence in support of the assertion, that at the time when Dacca and other districts grew fine qualities of Cotton, the general conditions, the relation of cost of production to price, and of price to the value of other kinds of agricultural produce, were not what they are now: nor is any direct evidence perhaps necessary: even within the last few years, the price of the staples of food is supposed to have greatly increased: it is indeed asserted by some to have doubled: and there is certainly a general impression that a change to a very serious extent has really taken place: no such change has obtained in the matter of Cotton, if we exclude the excessive rates which were reached in 1857—59. We have a small advance in price since 1815—25; but this has not kept pace with those changes alluded to above, as affecting the value of the staples of food and other kinds of agricultural produce. It may be well here to remind the reader, that in speaking of the *general relations* of the value of agricultural produce, it is fair to appeal to the time, when, under the stimulus of the Dacca manufactures, fine Cotton was profitably grown there, and in other parts of Bengal: whereas, when we come to compare *actual prices* now current, with those of former times, the legitimate field for such comparison cannot extend further back than the date above-mentioned; that is, than the extinction of the Bengal manufactures: and thus, although, as just stated, there has been a small advance in the price of Cotton since the extinction of the manufacturing trade, records exist of very high prices having formerly sometimes been obtained.

Returning to the question before us, we find that as Cotton was formerly profitably cultivated, it might be again, were the relations in which it then stood to the cost of production, and to the other agricultural staples, renewed: and we have to ask what light our materials can be made to throw on the three elements of the question, namely, the cost of producing the Cotton crop, the value of the crop when produced, and the corresponding values of other agricultural produce, as of the food staples for instance. I presume that we may assume it as extremly improbable that the latter will decline. The advance is stated to have been steady; it has been traced to causes in action around us, to the growth of trade and general prosperity, the increased value of labor, and to other such influences as are not liable to sudden fluctuations: it is of course not our business here to examine into this great question, and we accordingly accept, and quote as notorious, what has been generally accepted. But assuming this to be the case for the increase in the value of agricultural staples generally, the contrary, in every essential particular, is true for the present prices of Cotton: this has risen, as the past history of the trade proves to have always been the case, in obedience to causes not in action around us, or in any way directly connected with the general prosperity of this country, but quite extraneous to, and independent of, all such considerations: similar fluctuations have often before occurred in the price of Indian Cotton for export to Europe, but they have always been spasmodic and uncertain, and whatever, under existing circumstances, speculative conjecture may suggest, experience unequivocally prohibits that any confidence should be placed in the duration of the present high prices.

Thus then treating the subject from the point of view, which alone it is competent to us to take up, we have eliminated two of the above stated elements of the question, and reduced it to its simplest expression, namely, the cost of producing the crop, and its value, when produced, determined in accordance with a standard independent of existing or anticipated high prices.

MINISTRY OF CULTURE · GOVERNMENT OF INDIA
सत्यमेव जयते
CSL

The prospect viewed in the light of the past.

Considered in this way, the work which the intending exporter of Bengal Cotton for the English market sets before himself, is no less than this: he must cause Cotton to be grown, or grow it, by the application of whatever means, not now in use, so as to diminish the cost of production: or else, if he increase the outlay on cultivation, he must ensure such an improvement in the quantity, or the quality, of the out-turn, or in both, as shall more than balance the difference: we have seen that, in spite of all the advantages which Bengal enjoys, when compared with the Cotton-growing districts of the North-West and Central India, the crop does not spread: were it remunerative, it would do so: the intending exporter must then evidently make his account to alter the relation existing between the cost of growing it, and its value when grown.

With reference to the means of effecting this, the past history of the Indian Cotton trade very forcibly suggests, that some improvement in the quality of Bengal Cotton is absolutely necessary before it can take a permanent and satisfactory position in the English market: moreover, that not only must the quality be improved, in order to attain this result, but that the better article must be supplied in very large quantities, ere it can hope for thorough recognition: that isolated efforts, however successful, will not always command attention, and that bales by the thousand are necessary to effect even a fractional advance in price. It would indeed be in strict accordance with some of the most impressive lessons inculcated by that history, were the Cotton produced by skill, perseverance, and the judicious application of capital,—of good quality, and well prepared for the market,—ultimately sold in Liverpool, for a price below that which the filthiest of the country-grown produce fetched in the bazars, through which the exported bales had passed on their way from the factory or plantation to the port of shipment. In support of this statement, one instance will here be sufficient, others will be found in the body of the work.

In the years 1847—49 Mr. Hamilton Bell of Agra exported a considerable quantity of Cotton from the North-West Provinces, on account of Government* : in spite of the many difficulties with which he had to contend, in initiating an experiment of this kind and magnitude, his Cotton was laid down in Calcutta at 3.47*d.* per lb., and in Liverpool at 4⅛*d.* per lb. It happened, however, that a portion of this Cotton was not needed to complete the quantity authorized by Government, and some bales were accordingly sold in Calcutta on Mr. Bell's private account: these fetched a little more than 3½*d.* per lb., thus realizing a small profit: what went to Liverpool was sold there at a loss, namely, from 2⅝*d.* to 3*d.* per lb. The practical application of this example to the case before us is farther strengthened by the fact, that the prices of Cotton in the principal Bengal marts are, as a rule, always somewhat higher than those in the Calcutta bazar.† Indeed, Mr. C. Allen states that a further quantity of Cotton in excess of the amount authorized was sold by Mr. Bell at Mirzapore, with a profit of Rupees 4,000.

In the year 1848 the following six questions were circulated among the Revenue Officers throughout British India, by order of the Court of Directors :—

1*st.*—What is the price of Cotton freed from seed, at the principal mart or marts of your district ?

2*nd.*—At what price does the ryot sell his Cotton cleaned, or uncleaned, with or without advances ?

3*rd.*—What is the expense of cleaning Cotton by the churka, or foot roller, or by any other method which may be in use ?

---

* For the details of this experiment, the reader is referred to the second section of this volume.

† This statement rests on the evidence furnished by the Revenue Board Price Current Lists, compared with the best available information as to Calcutta bazar rates.

CSL

4*th.*—What are the expenses of conveying Cotton to the nearest port for shipment?

5*th.*—What is the average produce of Cotton per biga, or acre?

6*th.*—What is the quantity of land under cultivation with Cotton: and to what extent is it probable that the cultivation could be carried in the event of an increased demand?

These questions elicited a vast amount of very valuable statistic information, to which reference will be constantly made hereafter, under the head of each district, as it comes to be described. In many cases the general results were tabulated by the Collectors, the Commissioners, by the Secretary to Government in the North-West Provinces, and by the Board of Revenue in the Lower Provinces of Bengal. From those tables I have extracted and arranged in a tabular form the replies to questions 1, 4, 5, and 6, reducing the various coins and weights to pence and pounds, and bigas, when given, to statute acres. These tables, along with some others, prepared from different sources, to be hereafter mentioned, would, I thought, be most usefully scattered through the volume, each along with the chapter devoted to the district to which it especially referred: and the tables for Bengal Proper will accordingly be found at the end of this section.

In consulting these tables it must be borne in mind, that in their replies to that portion of question 6 which refers to the possible extension of Cotton cultivation, in the event of an increased demand, the different Revenue Officers have not all understood it in the same sense: and of course, have not, in their replies, taken the same view of the subject. Thus, some of the Collectors have sought to determine how far an increase of price might cause Cotton to replace some of the existing crops, and have accordingly in some cases discussed the relative outlay, returns, and profits derivable from each. Others, on the other hand, have referred in their replies only to lands now waste, capable of being brought under cultivation, supposed to be adapted to the growth of Cotton, and which, in the event of its becoming a remunerative crop, might, in their opinion, be so employed. In the former case, the area of the supposed extension is almost invariably spoken of as small, and the answers discourage sanguine hopes of any very material increase: while in the latter, vast tracts are often mentioned, and the possible increase is described as indefinitely great: nor is it at first sight always easy to perceive, from an inspection of columns of figures, how statements, apparently so dissimilar, are made by Officers concerning two adjoining districts, the general character of which is too nearly identical, to admit of our supposing that such discrepancies could be real.

A reference to the explanatory statements which originally accompanied the figures almost always explains (as above) how the apparent inconsistency arose.

The following statements are placed here, as they directly concern Bengal, although some of them also relate to other parts of India: for the figures and tables concerning the latter, the reader is referred to the last pages of the section devoted to the North-West Provinces. General averages calculated from the detailed information contained in the replies to the above six questions stand thus:—

For Upper India.

Wholesale bazar price of Cotton ...	2·14*d.* per lb.
Cost of transport to Calcutta	0·67*d.* ,,
Yield in lbs. per acre	121·3

For the Lower Provinces.

(Twenty-two principal provincial marts,
including those of Assam, Cuttack,
and also Moulmein.)

Wholesale bazar price of Cotton ...	3·37*d.* per lb.
Cost of transport to Calcutta	0·07*d.* ,,
Yield in lbs. per acre	204·0

CSL

Dr. F. Royle gives, as the result of his calculation for the whole of British India, the corresponding figures, as follows:—

Wholesale bazar price of Cotton ...	1·50*d.*	per lb.
Cost of transport to Calcutta (or other port)	1·00*d.*	,,
Yield in lbs. per acre	100	

With regard to the latter figures, I may remark that the smaller sum named as bazar price, arises from the fact that Dr. Royle took as his basis, whenever he thought he could rely on the data, the price paid by the middleman to the cultivator: could this be really ascertained, it would, of course, give results far more valuable than are furnished by the current bazar prices, to any one desirous of estimating the cost at which Cotton can be produced: but the Officers who furnished the information which we are now discussing, are unanimous in stating that it is quite impossible to arrive at any trustworthy data on the subject, complicated as it is by advances, and loans, and depending on continually shifting conditions.

I am unable to explain the discrepancy between the cost of transport to the port of shipment, as derived from the Revenue Officers' Returns, and that given by Dr. Royle: as a point of comparison, however, I may mention that Mr. Bell's Cotton, carriage and insurance included, cost only 0·37*d.* between Agra and Calcutta.

From the above figures we should have the cost of the Cotton of Upper India, in Calcutta, as 2·81*d.* per lb.: the bazar rates in Calcutta during this year (1848) ranged between the extremes of 2.55*d.* per lb. and 3·45*d.* per lb.: the figures from which the Bengal average is taken include, as stated, extreme points, but the average itself pretty faithfully represents the price which the Cotton of the North-West Provinces and Central India fetched in the great marts of the Ganges: this, it will be seen, is 0·56 (or more than ½*d.*) per lb. in excess of the calculated price of the same Cotton in Calcutta, and 0·37 in excess of the actual average of the selling price.

Dr. F. Royle estimates the cost of Indian Cotton, at the port of shipment, as 2·50*d.* per lb., and in another place he gives 2·77*d.* per lb.: the tendency of all the evidence on record certainly is to the effect, that if the profits of the middleman be got rid of, the lower of the above figures would be well within the limits of price which Cotton might be laid down in Calcutta: the reader need not be reminded that since the date to which all those figures refer, a rise in the value of all agricultural produce is stated to have taken place: the statements will, nevertheless, it is hoped, afford useful data for calculation, fair allowance being made for such disturbing influences.

PATNA DIVISION.

Districts.
PATNA.
SHAHABAD.
BEHAR.
TIRHOOT.
SARUN.
CHUMPARUN.

The three last of the districts into which the Patna Division is sub-divided, lie north of the Ganges, stretching up to the Nepal Terai: the other three lie south of the river. The whole division presents very great varieties of soil, climate, &c., including, as it does, part of the Gangetic delta alluvium, wide tracts of the older alluvium, and also considerable areas of the upland country: each district, too, contains within its boundaries many such varieties of soil and site: Shahabad and Behar probably most, and Patna itself least.

In 1848,* there were supposed to be 18,190 acres under the Cotton crop within the whole division, and the Commissioner did not think that this area was likely to be increased. The average yield per acre is given as 112 lbs. The average price is 3*d.* per lb., but it is stated that this bazar rate represents the price of the Cotton imported from

---

* The information referred to is contained in the answers to the six questions before quoted, *see ante page.*

CSL

Northern and Western India *viâ* Mirzapore,* and that the growth of the districts, whenever it is to be obtained, commands a somewhat higher price.

The present Commissioner, reviewing in May 1861 the evidence relative to Cotton cultivation, which he had collected from all sources, seems to arrive at nearly similar conclusions in regard to the probable extension of the crop: he thinks that it will, at least, be a slow process, dependent on the increased facilities of irrigation and inter-communication, which time alone can render available.

PATNA.

This district lies, for the most part, on the alluvium: it is stated not to grow Cotton, save to a very limited extent.

In 1790, the Commercial Resident reported that at that time five kinds of Cotton were cultivated in the district, each possessing recognized peculiarities: 10,000 mans were annually raised, but no export existed.

The only experiment in the growing of exotic Cotton, of which I have found any record, is one made by Mr. Commissioner Ravenshaw, in 1843.† He tried New Orleans seed, which he sowed in his compound in August: it came up well, and the young plants bore flowers in the following October, when only 6 inches high: in December the Cotton was picked: in the following April the plants flowered again, and yielded an abundant crop in May: they were once more flowering in August, after which we hear no more of them.

In the present year, Mr. Wake, in general terms, reports the failure of the exotic seed, which had, in 1860, been distributed among the land-holders of the district.

Cotton is not grown at present with a view to sale: in the Pergunnah Gyaspore 400 mans are annually produced, but only to be spun

---

* Often spoken of as Mirzapore Cotton.

† Agricultural Journal, Vol. II., page 197.

CSL

by the growers: this same pergunnah, prior to 1835, annually sent 2,000 mans to market: an inundation, which destroyed the crops in that year, is assigned as a cause why the cultivation was not resumed, but it is supposed that, were it to become really remunerative, the former out-turn would be rapidly attained: the fact being, that the rates at which the Mirzapore Cotton can be sold here, render it more profitable to the villagers to grow other things.

SHAHABAD.

There are certainly few districts in Bengal which present physical features more varied than those of Shahabad: and many different kinds of soil are found, from the rich alluvial flat over which the annual inundation spreads a thin coating of the finest silt, to the upland valleys, where a few acres of arable land occupy the sloping floor of narrow gorges among the rocky hills.

In 1790 the district is stated to have turned out an annual crop of 54,000 mans: four varieties were cultivated, and the finer kinds necessitated much care, and fetched high prices: they are stated at least to have rendered a rather costly method of culture remunerative.

The earliest experiment on exotic Cotton, of which I have found any mention, was made by Mr. J. Gibbon in 1836.*

He obtained a supply of Egyptian seed from the Agricultural Society, selected good land, ploughed it carefully, and sowed after some rain had fallen in July: the seed all germinated, but the young plants were much injured by rain, which afterwards fell in unusually great quantity during two months, and caused the failure of many of the ordinary crops of the country: the plants, owing to this, were sickly, in spite of the care he bestowed in hoeing, &c., and when, in September and October, they were subjected to continued heat and drought, these seemed to suit them as ill as the excessive moisture had done: notwithstanding all these disadvantages, the plants, although never healthy in appearance, grew to a larger size than those of the ordinary country Cotton, and yielded much larger quantities of Cotton, and as the grower believed, of a decidedly superior quality. It had, however, cost much more, and Mr. Gibbon had not tried how far a similarly careful cultivation might improve the quantity and quality of the yield of the indigenous kinds.

---

* See Agricultural Transactions, Vol. III., page 182.

In the same year, 1836, Mr. G. Leyburn had also tried Egyptian Cotton seed in Shahabad:* he selected a "good loamy soil," and sowed carefully in July: the plants yielded Cotton in December: in the March following they again flowered, and continued yielding Cotton up to the end of May: during the subsequent rains "they threw out new shoots vigorously."

Mr. Leyburn says that the staple of his Cotton is palpably superior to all varieties indigenous to that part of the country, and that it likewise possesses the most important advantages in the proportion of clean to seed Cotton which it yields: only half the gross weight of the raw produce of the Egyptian plants being that of the seed, while, for all Indian Cotton, this amounts to two-thirds or even three-fourths. The extent to which his fields had been robbed, rendered it impossible to estimate fairly the yield per acre.

The Agricultural Society's Cotton Committee reports that the sample submitted to them had been spoiled by rain stains, but that, although rather weak in fibre, it was soft and fine.

In 1841, Mr. G. Field† tried an experiment with Mexican and New Orleans seed: he sowed three *cottahs* of ground with each kind: he chose a light soil, which he describes as a red sandy clay: he sowed between June and August, and irrigated occasionally, but in all other respects his cultivation was carried on in the manner usual among the villagers of the district, and no extraordinary care was bestowed on the

---

* See Agricultural Transactions, Vol. V., page 52.

† Agricultural Journal, Vol. II., page 200.

CSL

crop. The Mexican seed failed, while the New Orleans all germinated: some heavy rain, however, injured the young plants, many of them drooped and died in September and October, and he was obliged to replace these with fresh seed. The plants of his first sowing flowered in October, but yielded less satisfactorily than those which came on later, and it was not until the following March that his best picking commenced. In May the plants all began to put out fresh leaves, and had by this time grown to fine healthy bushes: in July new pods had formed. This second crop he considered better both in quantity and quality than the first, and he calculated the produce as equal to 160 lbs. of clean Cotton per acre: the gross out-turn was decidedly higher than that of the native kinds, besides which the proportion of clean to seed Cotton was materially greater.

At the time when he sowed his own crop, he had distributed some of the same kind of seeds to a few of the best cultivators of thirteen different pergunnahs: giving to each of them a Nagri translation of Mr. Mercer's rules.* The general result of this experiment closely resembled that of his own in its commencement: the Mexican seed everywhere failed. As soon as he had seen that this was the case with his own sowings, he sent round to each of the villagers a fresh supply of the New Orleans seed to replace the other. This, as well as that originally distributed, for the most part, came up well during the rains, but in September and October many of the young plants died: when this had happened in his own fields, he had put in fresh seeds, and thus kept up his stand of plants, but the villagers had no where taken the trouble to do so: disgusted at the failure of the American seed, and the subsequent sickliness of the New Orleans plants, they came to the conclusion that the *Abohawah* (climate) was not suited to the exotic Cotton, and from the first sowing of the seed they accordingly utterly neglected the crop.

---

* Mr. Mercer was one of the American Cotton planters employed by Government, of whose proceedings an account will be found in the second part of this volume.

CSL

Writing in 1845, Mr. Field states that his plants had been then three years standing; that they had been occasionally weeded and hoed during that time, but not irrigated after the first season.

They were strong, healthy shrubs, and their yield, estimated in seed Cotton, had been at least equal to that of the most prolific of the native kinds: this he estimated at 600 lbs. per acre, of which 200 lbs. was clean Cotton, whereas from a similar quantity of the best native Cotton, only 150 lbs. could be obtained; two-thirds of the former and three-fourths of the latter being the weight of the seed and loss in cleaning: he also believes that the quality of the exotic Cotton is unquestionably superior to that of the indigenous.

In 1844, Mr. P. P. Carter* grew some Cotton at Bojpore, near Buxar, from Mexican seed imported in 1841. The plants grew well; they were healthy and vigorous, and the yield of his crop considerably larger than that of any of the native kinds of Cotton.

The Society's Cotton Committee did not think favorably of the sample submitted to them, regarded as a specimen of the Mexican variety of Cotton; but they consider it a fair marketable article, and say that if Cotton like it could be grown in such quantities, at such a cost of production, &c., as to render it profitable to send 20 million lbs. annually to Liverpool, at 3½*d.* per lb., it would take the place of the standard qualities of middling American Cotton.

I find no other mention of Shahabad, until the six questions of 1848 elicit some general statements, to the effect that the imported Mirzapore Cotton fetched about 3*d.* per lb. throughout the district, while that grown within it, always, when procurable, sold for a slightly better price. The total area under the crop in Shahabad was then estimated at 3,000 bigas, which the Collector thought might, under favorable circumstances, be extended; and the average yield was stated to be 120 lbs. per acre.

---

* Agricultural Journal, Vol. III., Part 2, page 179.

CSL

In 1861, Mr. Bingham, of Chynepore, estimates the area at present under Cotton in Shahabad at 8,800 acres. The plant is cultivated thoughout the district ; in some places extensively : there are few villages " which have the proper kind of soil, a light, friable, darkish vegetable soil, in which some bigas are not cultivated." He believes that 141,000 acres might be brought under the crop by the extension and creation of means of irrigation: he believes Shahabad to be very favorably circumstanced as regards its capabilities for growing Cotton : he thinks that India generally has at least this advantage over America as a Cotton-growing country, that the plant, exotic there, is here really indigenous, and that varieties like New Orleans and Sea Island, which, in the Western Continent, are annuals, are biennial in India, often triennial, and sometimes stand for even four or more years: the second year's crop being both more abundant and of better quality than the first. The plants need only to be cut down at the beginning of the rains each year, weeded and hoed about the roots, and occasionally irrigated in the hot weather. Mr. Bingham mentions plants now standing in his garden since 1856, which are healthy and prolific, and for which he anticipates still continued prosperity.*

Mr. Bingham speaks of the great importance of irrigation to the prospects of the district as a source of Cotton supply, and insists on the great facilities which exist there for the construction of bunds across the gorges of some of the hills.

Mr. Davies of Rhotas speaks of two varieties of indigenous Cotton known in that part of Shahabad: the *Rarhia* is cultivated altogether by means of irrigation, and ceases to yield when the first showers of the rains fall: the staple is greatly superior to that of the Mirzapore Cotton, and it fetches a better price in the proportion of 10 to 7, but is

---

* Many able and very interesting papers by Mr. Bingham, on subjects connected with general agriculture in Shahabad, and therefore indirectly bearing on the question of Cotton cultivation there, may be referred to in the late Numbers of the Journal of the Agricultural Society of India.

CSL

never carried out of the district for sale: from the costly nature of the culture applied to it, Mr. Davies thinks it improbable that it can be greatly extended.

On the table land beyond Rhotas, and in Palamow, a variety called *Raota* is extensively grown: it is sown in the rains, and the plant is sometimes kept two years standing: the produce is taken for sale to Sasseram and into Behar, and although inferior to the *Rarhia*, is still thought better than the Cotton brought from Mirzapore.

BEHAR.

Of this district we hear far less than of Shahabad, which it closely resembles in the variety of its physical features: the low lands lying along the Soane must necessarily, in many ways, contrast strongly with the upland portion of the south-east of the district from Sasseram to Gyah.

I find only one experiment on exotic Cotton recorded as having been made in Behar.

In 1841, Mr. Quintern[*] tried Mexican and Sea Inland seed near Gyah: premising that the season had been exceptionably bad and trying to all crops, he states that he sowed in May, following Mr. Mercer's instructions.[†] The seeds of both kinds germinated partially, but the plants had an unhealthy appearance, the pods looked small and mal-formed, and the produce was scanty. Frequent irrigation was necessary prior to the beginning of the rains: and many of the plants were knocked down and destroyed by the first heavy showers.

On the 23rd of June, just after the commencement of the rain, he again sowed the same kinds of seed in two small fields: about the 6th July all the Mexican seed had germinated, and the young plants made their appearance: some days later a few of the Sea Island plants also came up: fresh seeds were put down wherever the original sowings

---

[*] Agricultural Journal, Vol. I., page 31.

[†] Before alluded to.

CSL

had failed, and this process was continued throughout the rains, but with no great success: the few plants reared from the June sowings were stalky and weak, and the pods ill formed. The Cotton picked from those of the Sea Island plants, which came to maturity, was refused by the spinners, who said that they could not make thread from it.

The Mexican plants meanwhile flourished, and became strong and fruitful: the pods were large, full, and perfect, and the produce abundant: they were, however, attacked by insects, which spoiled one of the divisions of almost every pod. This Mr. Quinten attributes to the unfavorableness of the season: the ground was never watered until the Cotton was being picked in November and December, and then only twice, as an experiment.

He also distributed some of these seeds to native cultivators: the result was similar to that in his own case: the Sea Island seed failed almost every where, and the Mexican generally throve: he states that the Mexican seed, as treated by the natives generally, gave a crop superior to that which he had himself succeeded in rearing. He concludes that the Mexican Cotton should, in this district, be sown soon after the beginning of the rains, and that it is well suited to the country: that a valuble crop can be secured without incurring any extra expense in cultivation, beyond that applied ordinarily to the native Cotton: finally, there can, he thinks, be no doubt of the superiority of the produce to that of the varieties commonly grown in Zillah Behar. Samples were sent to the Agricultural Society: the Cotton Committee reports on these:—

The *Mexican* Cotton was pronounced an excellent specimen of its kind in length, strength, and color; and the quantity of fibre to each seed was large: it was valued at 5¼ to 5½*d.* per lb.

The *Sea Island* Cotton was thought poor: little fibre to each seed, and that of unequal length, &c.; much of it, however, was long, strong,

CSL

and fine; it was much stained, and generally bad colored: stated to be worth 8 to 9*d.* per lb. in its then bad condition, or, if clean picked 10 to 12*d.* per lb.

Some *indigenous* Cotton, forwarded along with these for comparison, was a bad sample of the common Bengal Cotton: in length its fibre was found to be only one-third of that of the Mexican Cotton grown by Mr. Quinten, itself a short staple kind, besides which it was harsh, coarse, and amazingly tenacious to its seed, worth perhaps 2½*d.* per lb.

In 1848 there were supposed to be 7,000 bigas of land under Cotton in Behar, and the Collector thought that were the crop treated on the same system as that adopted in regard to Opium, and advances given to the cultivators, this area might be extended to 12,000 bigas: the average price of the Mirzapore Cotton in the bazars was 3*d.* per lb.

In 1861 Mr. Furrell states that the Cotton grown in his district is quite inadequate to its requirements, and that it has always imported Cotton; certainly since the commencement of this century.

" That it cannot be doubted that the cause of this state of things is " of a constant and not an accidental nature, while the fact that Behar " is a considerable weaving district renders it improbable that this cause " is either over-rated or easily removable." The exotic seed distributed in 1860 had not succeeded, and Mr. Furrell thinks that, although the failure had been attributed to the badness of the seed itself, and to an unusually unfavorable season, it at least suggests that there may probably be some general unsuitableness of soil or climate: he also thinks that other and more profitable crops, now cultivated to the exclusion of Cotton, will continue to be so cultivated; and that the only reasonable expectation of any considerable extension of Cotton cultivation must be based on the future construction of costly irrigation works.

The Commercial Resident took a somewhat similar view when he reported, in 1790, that although a choice kind of Cotton called *Rurrea*[*]

---

[*] Probaby the *Rarhia* spoken of by Mr. Davies.

was grown in Behar in his time, " it was not generally thought as profitable as other crops."

TIRHOOT.

This district lies north of the Ganges and stretches thence to the Nepal Terai: much of its area is stated to be subject to annual inundation: a great part of it is formed of the undulating ground of the old alluvium, and the whole is generally asserted to be of great fertility: the district likewise possesses considerable facilities of water-carriage, and many good roads exist: facilities for irrigation are also said to abound in many parts of Tirhoot.

In 1790 the Commercial Resident stated that the annual Cotton crop was estimated at 1,300 mans: it consisted of five distinct varieties, for some of which the very best land in the district was required: and he asserts that there was a general impression that other crops gave less trouble, and were more remunerative. There was no export.

In 1833 Colonel Hamilton tried Sea Island seed in Tirhoot: he sowed in a rich, moist soil: the plants yielded well, and after being pruned, bore again, " which no indigenous Cotton does": he thought that the quality of this second crop was not so good as that of the first, and did not believe that this Cotton could be made to yield a profit: nor did he think that any Cotton would ever be a successful crop in Tirhoot. Some Cotton was grown in almost every part of the district, but only for local use, and considerable quantities were imported from Mirzapore.

In 1844, a sample of Upland Georgia Cotton, grown in Tirhoot from American seed, was submitted to Mr. Willis of Calcutta: he considered it very inferior to Cotton of that kind as grown in America, but decidedly better than the best of the produce of Bundelkhund and the North-West Provinces: the specimen had been slightly soiled, and was valued at 4¼ to *5d.* per lb.

CSL

In 1848 the Revenue Officers state that there were supposed to be then 5,000 bigas under Cotton in Tirhoot, and extension was not thought possible, inasmuch as the natural conditions were not generally favorable to the crop : the average yield per acre was rather high, and the average price of the Mirzapore Cotton was 3*d.* per lb.

In 1861, the Collector states that Cotton is grown in Tirhoot only in small quantities, and exclusively for local consumption: the cultivators of "high irrigated lands" in parts of the district produce a little for their own use: no export trade exists, and no one occupies himself with the crop with a view to the market: no prejudice is, however, believed to exist against it, and he thinks that if a price were offered, which would render it remunerative, Cotton might be largely introduced.

SARUN.

CHUMPARUN.

Of the Cotton-producing capabilities of these districts still less is known than of Tirhoot, and I have not found any experiment described as having been made in either with exotic Cotton seed. In physical character they closely resemble Tirhoot, and their soils, &c., must be very much of the same general description.

They possess, however, still greater advantages than Tirhoot in the important matter of water-carriage: having very great lengths of river frontage along the Gunduk, the Gogra, and the Ganges itself.

Moreover, the northern portions of both are stated to offer very great facilities for irrigation, and the soils of the old alluvium of which their surface, for the most part, consists, are stated to be of extreme fertility.

In 1790 two kinds of Cotton were known in these districts, and in Sarun (no mention is made of Chumparun by the Commercial Resident)

GSL

5,000 mans were annually grown ; the crop was not, however, in favor, and no export took place.

In 1848 Chumparun was declared by the Collector to grow no Cotton, and no reply was given to any of the six questions relating to the Cotton crop and Cotton trade: Sarun was stated to grow very little, and no estimate of the area under cultivation was offered: the yield per acre is high: the average price of the imported Cotton is given at 2·75*d.* per lb.

In 1857 the Collector of Sarun reported that "the Cotton plant is "cultivated in this district on soils called *dorus,* or argillaceous loam, "mixed with sand, and easily pulverised by being heated, and possess-"ing a sufficient degree of natural moisture." No irrigation is employed: the cultivation is described as very careless, the interests of the Cotton plant being confessedly sacrificed to that of other kinds of produce as Indian corn and oilseeds, along with which it is sown : the sowing takes place in May and June ; the crop is twice weeded ; picking is completed in March and April ; the stalks are used for fuel ; the only danger feared is that arising from high winds during the flower season: no estimate of yield per acre, or per hand employed, is possible.

In 1861 the quantity of Cotton produced in these districts is stated by the Collectors to be quite inadequate to supply their requirements, and that a considerable import takes place : the crop is considered a very troublesome one, and not particularly remunerative : but it is believed that no special difficulty would be found in extending the cultivation, were it thought to be a profitable one.

The Collector of Chumparun states that the lands best suited to the growth of Cotton are situated in the north and north-west of his district, and he thinks that "any quantity might be grown in the valleys and low lands adjoining the Terai."

CSL

BHAUGULPORE DIVISON.

Districts.
MONGHYR.
PURNEAH.
BHAUGULPORE.
SONTAL PERGUNNAHS.

This division, like Patna, includes a great stretch of country from the foot of the Himalaya to the Ganges; and south of the river, it comprises both the alluvial flat and a part of the upland country beyond. Much of that portion of the division lying north of the Ganges is formed of the old alluvium, but considerable areas are stated to be subject to annual inundation.

In 1848 the Commissioner stated that "the districts comprised in "his division are not suited to the growth of Cotton, but that no infor-"mation of much value can be obtained on the subject." The average price of the Mirzapore Cotton was then about 4*d*. per lb. within the division: the average yield per acre is stated at 160 lbs. The people, it was thought, would not readily abandon the cultivation of opium, indigo, or other crops which are found remunerative, for Cotton, which is held in doubtful repute. The latter cultivation was estimated at 6,000 acres for the whole division.

In 1861 the Commissioner saw no chance of a rapid increase of the Cotton cultivation carried on in the division: but he thought that for many parts of it at least, the people only waited to be convinced that it would pay better or even as well as other things, in order to sow it largely, and that if a constant demand existed in a market near at hand, the cultivation would soon spread.

MONGHYR.

That portion of this district which lies south of the Ganges belongs to the upland area, with the exception of a small tract of very rich alluvial soil, spreading round the base of the hills which are touched by the Ganges, at the spot where the city of Monghyr is built. North of the river there is a wide tract of country subject to annual inundation,

GSL

and all that part of the Monghyr district which lies on that side of the Ganges belongs to the alluvium.

Of the upland portion of the district I nowhere have found any mention: it is for the most part covered with jungle, and does not, I believe, contain much really fertile land, save here and there a small patch among the gorges of the Kurrukpore Hills.

In 1848 the Collector states, with regard to the rich lands above mentioned, lying south of the river, that a system of advances might stimulate the cultivation of Cotton, but that he believed the poppy would generally be prefered, and that the extent to which it is now cultivated in that part of the country, would materially interfere with any great extension of the Cotton crop.

The existing Cotton cultivation was almost confined to the lands north of the Ganges: the seed was sown on ground annually flooded, and the culture was most careless: other seed was sown along with the Cotton, by whose presence the latter was stunted: the yield of the Cotton, taken in this way along with other things, was estimated at 56 lbs. per acre: no disease was known to affect the plant, nor did insects attack it: still in spite of the little care which was bestowed on its cultivation, the expenses were supposed to exceed the value of the produce, and the crop was believed to be seldom profitable.

The aggregate area under this crop was estimated at 2,000 bigas, and the price of the Mirzapore Cotton was 3·5*d.* per lb. at Monghyr.

In 1861 the Commissioner states that "the intervention of Government is considered necessary for the encouragement of the cultivation," probably alluding to the system of advances above adverted to, as likely to bring Cotton into competition with the opium cultivation.

PURNEAH.

This district lies exclusively on the north side of the Ganges, stretching from the river up to the Darjeeling Terai and the Morung: in its southern part it includes a considerable tract of the delta alluvium,

CSL

while its northern portion is formed of the gently undulating surface of the old alluvium. It is intersected by several navigable streams, and the absence of cross roads is stated not to be a very material disadvantage, inasmuch as during the dry season the whole country can be traversed in every direction by carts: the soil is stated to be very fertile. In 1790 the Commercial Resident states that Cotton of local growth is never offered for sale in the bazars, as that imported can always undersell it; but that, neverthless, considerable quantities are grown for local use.

In 1848 the Collector affirms that "no Cotton whatever is cultivated in the district;"* that the imported Mirzapore Cotton costs 3½*d.* per lb.

In 1861 the Commissioner states, that in the north of this district, (as well as in the Morung, which lies between it and the foot of hills,) there were tracts of land where the cultivation of Cotton would succeed, and recommended those interested in the trade to organize a scheme for obtaining it from thence.

BHAUGULPORE.

A considerable portion of this district lies north of the Ganges, stretching as far as the Terai, and part of it lying south of the river, includes some of the upland area in that direction: both north and south of the river the newer alluvium occupies much of the surface, and some of the older clays are also found in both parts of the district: the station of Bhaugulpore stands on the latter soil.

In 1845, Major Napleton† presented to the Agricultural Society samples of Cotton grown by him at Bhaugulpore (in the station public garden), from Upland Georgia Seed. He stated that the yield had been very large, but the fibre had been so much injured in the process of cleaning as to be very inferior to the American produce of the same kind.

---

* Dr. Campbell states that, about 1850, the Cotton from Sikkim and the Morung sold readily at Kissengunge for 5*d.* per lb.

† Agricultural Journal, Vol. IV., Part 2, page 23.

Major Napleton shared in the distribution made by the Agricultural Society of Mexican Cotton Seed acclimated by Dr. Wight, at his Coimbatore farm, and sent to Calcutta in 1847.

He states* that it reached him very late in the season, and had hardly a fair trial; he sowed it in a poor red sandy soil, and he sent samples to the Society of his first and second crop from the same plants.

The Society's Cotton Committee pronounced the former to be very poor, and worth only 3½*d.* per lb.: the latter they thought a little better, but not worth more than 4*d.* per lb.

In 1848 the Collector stated that "there might be said to be no "Cotton cultivation in his district, but that there appeared to be "a fair quantity of soil adapted to the growth of the plant." The land was, however, otherwise occupied, and he did not think an increase of the Cotton crop probable.

Some Cotton was, however, grown for local consumption, but no estimates of price, of yield per acre, or of area were given.

In 1860 Mr. Commissioner Yule states that the villagers had been discouraged through the failure of some exotic seed distributed by him in 1859, but that if a further supply could be sent in time for the next sowing season, he will again have it tried: he states also his conviction that experimental cultivation on a small scale, and at Government expense, would be productive of no valuable results.

SONTAL PERGUNNAHS.

This district consists of a tract of hilly country stretching southwards from the Ganges near Rajmahal, to the Barrakur, and almost as far as Parisnauth Hill: it belongs to the upland area, but parts of its surface are very fertile, and although much is covered by

---

* Agricultural Journal, Vol VII., page 202.

CSL

jungle, a fair proportion of this is stated to consist of reclaimable arable land. Our information on the subject of its Cotton producing capabilities is confined to its northern parts, namely, the country known as the Damun-i-koh, or Rajmahal Hills: so far as analogy may be taken as a guide, the southern portion possesses equal natural advantages, and a much wider area: in the important matter of carriage, however, the Damun-i-koh is certainly very exceptionally fortunate: the railway from Synthia Station to Rajmahal passes for many miles parallel and close to its boundary, and then turning west, runs within or close to the district nearly as far as Colgong; even the Southern Pergunnahs are more favorably situated than most parts of the uplands of Bengal as to means of transport, for their boundaries approach the Grand Trunk Road and the Raneegunge branch of the railway.

The soil is stated to be in many places very fertile, and great facilities are believed to exist for irrigation by bunded tanks.*

Mr. Pontet obtained from the Agricultural Society a supply of Dr. Wight's Mexican seed, acclimated at Coimbatore, and imported in 1847-48: he sowed it in the district (the Damun-i-koh, now the most northern of the Sontal Pergunnahs): it succeeded remarkably well, grew vigorously, bore largely, and all the seed obtained from the first crop was taken up and sowed by the Sontals.

The sample which Mr. Pontet sent to the Agricultural Society was greatly praised by the Cotton Committee, who valued it at 5*d.* to 5½*d.* per lb.†

In 1850 a fresh supply of the same kind of seed, which is stated to have grown at Coimbatore for nine generations, was sent to Mr. Pontet and sown by the Sontals.

---

* That is, by damming up the mouth of a gorge, so as to form a tank whence the water can be drawn off at will.

† It is noticeable that some of this same batch of seed sown by Major Napleton in the adjoining district did not produce nearly so favorable a result.

CSL

A sample of this growth was, in June 1851, submitted, among many others of Indian-grown Cotton, to Messrs. J. Cook and Co., London brokers: it was pronounced to be a fine specimen of good long staple, and if clean, equal to fair New Orleans, and worth 6½*d.* per lb.

In 1859 Mr. P. Burke sent to the Society* samples of Cotton from Koosma, in the Damun-i-koh; they were of two distinct kinds: the plants from which they were gathered were of different varieties, one being the common country Cotton, and the other descended from seeds distributed by Mr. Pontet: some of the Sontals thought that the latter had been brought from Chota Nagpore fifteen years before: it was probably the Mexican seed, which at that time had grown for eighteen years in India. Mr. Burke states that it is most carelessly cultivated, and that some of the plants always die for want of water during the dry weather: the soil best suited to the crop is that just above the alluvial flat, but it will not grow in any very moist soil, nor on flooded land near a stream: its superiority to the ordinary country Cotton is universally recognized.

The Cotton Committee valued the sample at 6*d.* per lb. Again, in 1860, Mr. Burke† exhibited samples of Cotton grown from Mexican seed in this district; he also sent some of the common country Cotton: the Cotton Committee pronounced the former to be of good color, fair, strong staple, and a useful marketable article, worth 7*d.* per lb.: the latter quite unsaleable in ordinary times, coarse and harsh, though strong and well colored, would now fetch 4*d.* to 4½*d.* per lb.

In 1861 Mr. Assistant Commissioner Wood recommends the Rajmahal Hills as a promising country for trying exotic Cotton: irrigation by bunded tanks could every where be cheaply effected: labor abounds, considerable areas of Khass lands‡ are available, many fair-weather

---

* Agricultaral Journal, Vol. XI., page 179.

† Ibid, Vol. XI., page 418.

‡ Lands where no proprietory right has been created between the cultivator and the Government.

CSL

roads intersect the country, and the railway affords great facilities. He sent samples of an exotic Cotton now very common throughout the district, and the produce of seeds distributed many years since by Mr. Pontet.*

Mr. P. Saunders reported on these samples : he describes the Cotton as of fair staple and strong fibre, well colored, and fully equal to middling New Orleans of American growth : he affirms that no sign of degeneracy is to be found, and this, although it has been long acclimatized and notoriously ill treated during the successive years, that it has been cultivated in the Damun-i-koh : he could not determine whether this was descended from the Coimbatore Mexican seed of 1847—50, or from some Upland Georgia distributed by Mr. Pontet in the latter year : he believes the sample to be equal to either, and anticipates valuable results when it gets a fair chance under careful cultivation.

RAJSHAYE DIVISION.

Districts.
RUNGPORE.
BOGRA.
DINAGEPORE.
MALDA.
RAJSHAYE.
PUBNA.
MOORSHEDABAD.

The northern portion of this division touches the Darjeeling Terai on the west, and stretches to the south of the Cooch Behar territory and the Bhootan Doars : on the east it reaches to the Bramaputra and the Moorshedabad, and part of the Pubna districts lie south of the Ganges. Its soil is composed to a great extent of the older alluvium, but it includes considerable tracts of the delta alluvium also : it nowhere takes in any of the upland area : its general fertility is great, and its facilities for water-carriage very considerable; besides many minor streams, navigable during a portion of each year, it commands for many a mile the banks of the Ganges and Bramaputra.

---

* *See ante.*—Mr. Pontet has, it is evident, succeeded in effecting what so many have attempted in vain : I have met with no other instance within the Bengal Provinces, of the introduction of an exotic Cotton, and its complete establishment as a regular staple of native agricultural produce. A list of those who, after devoting much time and money to effect this long desired object, have signally failed, would contain many a well known name.

In 1848 the Commissioner merely recorded his opinion that, save parts of Rungpore, no district in his division could grow Cotton.

In 1861 the Commissioner states that in 1857 it had been ascertained that only four of the districts of the division grew Cotton at all, and that the out-turn in that year had been :—

Dinagepore ...	100 mans.
Bogra ...	50 „
Rajshaye ...	16 „
Rungpore ...	2 „
Total for the division ..	168 mans.

The Commissioner doubts if even, with a prospect of a demand, the cultivation of Cotton will expand very considerably in his division, except, perhaps, in the districts of Dinagepore and Rungpore: "even there "the very large crops of rice, sugar-cane, tobacco, and of other equally "valuable products now raised, yield a very remunerative, and, generally "speaking, very safe return, and unless the soil of the two districts is "peculiarly adapted for Cotton, it is not likely that staple crops will be "superseded to any extent for the mere chance that Cotton may prove "more remunerative still."

RUNGPORE.

This district lies between the Morung and the Darjeeling Terai, on which it abuts on the north-west; and the bank of the Bramaputra, which bounds it on the south-east; its soil is of great fertility, formed for the most part of the older alluvium; it is stated to be one of the richest and best cultivated districts in Bengal: its soil retains the moisture throughout the year, and even in March and April,

GSL

showers always fall; irrigation is never necessary: some of the soil is described by Mr. Terry as a black loamy clay, and sometimes a black sand is mixed with this; higher on the undulating ground, a light red soil is found, and in some parts sandy plains exist.

Cotton is grown throughout the district in gardens and round houses, and Mr. Terry found some of this Cotton growing on very fine large bushes bending to the ground under the weight of the many pods they yielded. Cotton is also sown in many places along with capsicum, ginger, &c., and even with indigo.*

In 1844 Mr. Rebling grew some Cotton from New Orleans seed,† supplied by the Agricultural Society: it had been obtained from the Coimbatore farms. He states the yield of his crop to have been immense, but that the produce had been much injured by insects: he insists on the great natural fertility of the soil, and on the fact that the climate is well adapted to the Cotton plant.

The sample which he sent to the Society was not considered a good specimen, although stated to have some good qualities.

Mr. Terry, the American planter, reached Rungpore in the hot weather of 1844. After inspecting the district, he expressed himself hopefully of its capabilities as a Cotton-growing country: he states that much of the land is subject to inundation, and recommends the poorer and more sandy soils on the higher grounds: he thinks that the soil best suited to Cotton is one not too rich, and rather sandy. Such a soil, he says, is to be found on the high banks of the Ghanghut River.

Mr. Commissioner Jackson inspected Mr. Terry's plantations in 1845; he found 15 bigas of American and Bundelkhund Cotton growing; the crop was looking very well, but on examining the plants closely, he found that every second pod was blighted by an insect to an extent which would prevent the yield from being profitable: he also inspected the Cotton

---

* Mr. Terry's reports.

† Agricultural Journal, Vol. III., Part 2, page 262.

CSL

grown by some villagers, who had, some years before, been induced by Mr. Bonnevie to try exotic Cotton seed : he found the plants from that seed then grown to large vigorous bushes, several years old : he had every reason for believing that they had proved profitable to those who had grown them, but the cultivation had not spread : one villager, from whom he obtained some particulars concerning the amount of Cotton yielded by his plants, informed him that his landlord had announced his intention of raising his rent in consequence of the profitable nature of this new Cotton crop.

This fact naturally suggests one reason why the cultivation had not spread, and Mr. Jackson states generally that the Garrows, who inhabit the hilly country on the other side of the Bramaputra, can grow Cotton, and sell it profitably in Rungpore, at a price so low, that the crop could never be a remunerative one within the district.

In 1848 the Collector of Rungpore stated that an immense extension of the Cotton crop within his district was possible, but that little or none was then grown: the price of the imported Cotton* was 2.89*d.* per lb.

With regard to the statement above quoted, to the effect that this district grew only two mans of Cotton, it is somewhat difficult to make out to what it refers; possibly to some bazar where this quantity may have been offered for sale : it may be fairly considered to be very improbable that the Cotton cultivation in gardens and near houses spoken of by Mr. Terry and Mr. Jackson, in 1845, had become extinct in 1857.

The old returns of 1790 state that there were then 375 mans annually raised, mostly of a kind called *Chintea*, which was cultivated on the higher grounds, but considered a bad quality in the market: the crop was not thought a remunerative one, and a considerable import trade existed.

---

* This refers to the hill Cotton above spoken of, not to that of Mirzapore.

CSL

BOGRA.

This district lies south of Rungpore and Dinagepore, along the bank of the Bramaputra.

In 1848 the Collector stated that it grew very little Cotton, and that little "thinly scattered among pepper, turmeric, &c., for domestic pur-"poses only: the extent to which it might be grown is not capable of "estimation."

In 1861 the Collector reports that the cultivators of the district grow no Cotton, solely because they find that other crops are more remunerative: that of the total area of the district two-thirds are well suited to the crop, and he estimates at 52,000 mans of seed Cotton, or 1,040,000 lbs. of clean Cotton, the possible annual out-turn.

He believes that a European dealer, who was prepared to make advances at a rate sufficiently high to make the crop profitable to the grower, would find no practical limit to his operations; and a few inexpensive roads would connect all parts of Bogra with Nokollah, on the river, which is visited by steamers.

DINAJEPORE.

This district lies on the old alluvium; its soil is stated to be very fertile, and it was recommended to Mr. Terry instead of Rungpore, on the ground that more Cotton was grown there. The higher grounds are stated to be suited to the crop: I have found several allusions to a supposed formerly extensive cultivation, but not any definite statements in confirmation thereof.

In the old returns of 1790 the district is not mentioned.

In 1848 the Collector said that the Cotton cultivation was probably under 500 bigas: that the soil was not considered suited to the crop, which was looked on as an uncertain one, and very troublesome in cultivation: he did not think that Cotton would ever be extensively grown in his district.

No experiment appears ever to have been tried on the cultivation of foreign kinds of Cotton.

CSL

MALDA.

This district lies for the most part on the delta alluvium.

In 1790 a small quantity of Cotton is stated to have been grown on the higher grounds: the *Nurma* and *Byratta* varieties are mentioned as being cultivated.

In 1848 the Collector states that Cotton is not cultivated, and that "the soil is supposed to be not adapted for its production," and that the Mirzapore Cotton cost about 3*d*. per lb.

In 1861, the Collector states, on the authority of Dr. Buchanan Hamilton, that the district once grew Cotton to a considerable extent: great facilities for irrigation he says exist.

RAJSHAYE.

This district, like the last, is mainly situated on the newer alluvium, extending northward from the left bank of the Ganges.

It is stated in the returns of 1790 to have grown a small quantity of Cotton solely for local consumption, and always spun by the growers, who sometimes offered the yarn for sale, but never the Cotton: four varieties were then known and cultivated on the higher lands in the north of the district, and irrigation was applied, whenever available, in their cultivation.

In 1848, 2,000 bigas were supposed to be the extent of the cultivation, and the Collector thought that there was no prospect of extension: large quantities of Mirzapore Cotton annually found their way into the district, at an average price of 3*d*. per lb.

PUBNA.

This district is altogether within the delta alluvial area.

The returns of 1790 state, that at the factory of Hurriaul, both Surat and Mirzapore Cotton were largely used, but that certain Cotton grown in the district in small quantities was more esteemed, and paid for at a higher rate than either.[*]

---

[*] I find that the Resident mentions the *Byratta* as an inferior and low-priced Cotton here, although generally this name is applied to the very finest of Bengal-grown Cotton, especially in Dacca.

In 1848 the district is stated to grow absolutely no Cotton, and the same statement is made again in 1861.

MOORSHEDABAD.

This is also an alluvial district, barely touching on the extreme limits of the undulations of the old alluvium, and the lower slopes of the upland area.

In 1790 two varieties were known, and an annual crop of 7,000 mans raised: the cultivation is stated to have been careless, the Cotton being grown in the same land with other crops.

In 1848 the Collector states that there is no Cotton grown in any part of his district, except within the Noorye Thannah, where there are 500 or 600 bigas under the crop, and 100 or 200 bigas more, on which it might be raised: he estimates the yield as about 90 lbs. per acre: the average price of the Mirzapore Cotton was about 3*d.* per lb. at the great mart of Jeagunge.

In 1857 the Commissioner of Nuddea gives the particulars of an account furnished by the Deputy Collector of Jamookandy, which subdivision* "comprises all the Cotton cultivated in the district. The "places where the Cotton is grown are high and dry lands; they are well "ploughed and manured, and considered fertile: they are not fit for "the rice crop. Irrigation is occasionally employed from the cold weather "to the beginning of June. After being well manured and broken up, "the ground is allowed to lie for a month, when it is ploughed again, "until the manure is well worked in: the seed is soaked before "sowing, and is in the ground before the end of October. The labor "required for weeding and picking, &c., per acre, is that of from "100 to 125 coolies. The ginned Cotton fibre produced per acre is

---

* There is an apparent discrepancy between this statement and that made by the Collector in 1848. I have failed to identify Noorye with Jamookandy, but even if they refer to two distinct places, the Noorye spoken of lies on the western borders of the district, and is, like Jamookandy, situated on the old alluvium.

"from* 3½ to 4 mans ; the weight produced per hand employed is "7 to 8 seers." †

The area which presents the above conditions is circumscribed, and the cultivation could not probably be very materially extended ; it is thought the district generally presents great facilities of water-carriage, and the railway now runs through the western part of it.

NUDDEA DIVISION.

Districts.
SOONDERBUNDS.
24-PERGUNNAHS.
NUDDEA.
JESSORE.

The Nuddea division forms an irregular triangle, whose base rests on the sea at the head of the Bay of Bengal, and whose vertex is the point where the Jellinghy River joins the Ganges. The Jellinghy and Hooghly Rivers run along its western side, and the Ellenkhal and Hooringattah Rivers form its eastern boundary ; it constitutes the central portion of the great Gangetic Delta, and includes a great length of the seaboard area within the Soonderbunds ; much of its surface is of great fertility, and the means of water-carriage abound throughout.

SOONDERBUNDS.

This district constitutes the seaboard of the delta ; its southern portion consists of low lying swampy land and salt marshes, with some fertile tracts ; impenetrable forests, broken here and there by partial clearings ; the whole intersected by the endless ramifications of tidal brackish estuary channels, many of which are navigable by large vessels : and it passes towards the north into the plain country of Bengal, apparently by insensible gradations. The islands lying along the coast must

---

* That is, 280 to 320 lbs. per acre.

† This probably means that 14 to 16 lbs. are picked per day by each laborer, for if taken as referring to the 100 or 125 men (or day's work) needed per acre, it would make the produce per acre 1,400 to 2,000 lbs., instead of 280 to 320—itself a very high estimate.

CSL

be considered as part of it, from Sundeep* to Sagur: and indeed the whole south portion of the Soonderbunds may be considered as a collection of islands.

Mr. B. Metcalfe, who was sent to India in 1815 by the Court of Directors to organize some system of management by which the quality of their Cotton might be improved, placed on record his opinion, that the Soonderbunds could be made to grow "Georgia, Surinam, Demerara, and Sea Island Cotton, all kinds always high priced."

Moreover, Dr. F. Royle, many years ago, urged that the islands of Hattia and Sundeep should be tried with seed of those kinds which flourish on low coasts elsewhere.

In 1833 Mr. Kyd grew Sea Island Cotton on Sagur Island, and Mr. J. Findlay pronounced the samples of this Cotton submitted to him, to be very fine specimens of the kind to which they belonged, and the best he had seen of Indian growth.

In 1836 Mr. J. Cook grew Cotton in the Soonderbunds, from Peruvian seed: Mr. G. Prinsep exhibited samples of this Cotton at a meeting of the Agricultural Society, and they were pronounced to be long and fine in staple, as well as strong and readily separable from the seed.

In 1857 Mr. Bazely examined samples of Cotton which had been grown from Sea Island seed on the bank of the Mutla River: he stated it to be a most excellent and beautiful Cotton, worth in the then state of the market 19*d.* per lb.: a few weeks before it would have been valued at 23*d.* per lb.

In 1858 Mr. Tiery† sowed in October 50 bigas of Soonderbund land with Mexican Cotton seed: a storm before the end of the month broke in his embankments, and swamped and destroyed all the seed: with some which had remained over, he subsequently sowed one biga: the crop

---

* Fiscally belonging to the Arrakan division.

† *See* Agricultural Journal, Vol. XI., Page 414.

CSL

throve well, flowered, had begun to yield in April, and was still bearing Cotton in September, when the plants looked healthy and strong: he had picked four mans in all.

The samples which he sent to the Agricultural Society were pronounced to be bad colored and weak, short and coarse in staple, and quite unsaleable.

Mr. F. Hill made some experiments in 1858*; he appears to have tried Sea Island, New Orleans, Seychelles, and Pernambuco, for he states his belief that the two former will be found to succeed better than the latter: he did not believe that sowing in or before the cold weather would do, for the drought of March was fatal to the young plants: insects, he says, are never injurious after the plants have attained a growth of six inches: he found that, during the rains, all the plants growing on low ground withered away, while those in higher situations survived: these latter were subsequently attacked by white-ants, which "undermined and sapped" them: he found, however, that he could protect the roots by applying, what he speaks of as, a "decoction of oil-cake."

The situation which he selected was too low: Mr. Agabeg, who had sown a crop on higher land, succeeded better than he had done: he believes that "lot 42" will not answer for Cotton planting. Speaking generally, he believes that the Soonderbunds of the 24-Pergunnahs are greatly subject to inundation, and that their soil is very generally saline. The Jessore Soonderbunds are of very much the same general character.

Those of Backergunge, however, are more favorably circumstanced: east of the Balissur River and along the Megna there are lands well raised above the river banks, free from, or rarely subject to, inundations: embankments are there unnecessary, and labor is plenty: he recommends these tracts to intending Cotton planters: they have not been tried, while places not affording equal advantages have always been those chosen for experiment.

---

* *See* Agricultural Journal, Vol. XI.

CSL

He believes that, in the Western Soonderbunds, the area sufficiently raised above the water-level, to give the Cotton plant a fair chance, is not extensive enough to warrant any trial on a great scale: a slight elevation would answer the purpose: less than three feet is supposed to be ample: Mr. Hill estimates that ground could be artificially raised to this extent at a cost of Rs. 102 per biga.

Mr. Robinson thinks that Mr. Hill's estimate is excessive, and believes that if the operation were to be undertaken on a large scale, ground could be raised three feet above the water-level for much less than Rs. 102 per biga.

The Secretary of the Mutla Association says that the results of experiments already made prove that—

1*st.*—Cotton of superior quality, both short and long-stapled, can be grown in the Soonderbunds.

2*nd.*—That the very saline soils will not answer for any of the varieties tried.

3*rd.*—That none of the more elevated tracts have soils too saline for the Cotton plant, and that an elevation of something less than three feet above the average level is sufficient to ensure all the conditions essential to success.

He states that when a part of lot 50 was lately being cleared, Cotton was found growing wild: he does not suppose that the plant is really indigenous here in the wild state, but concludes that those found were the survivors of some ancient and long-forgotten cultivation. He believes, however, that their presence is sufficient to prove that the plant must have found congenial conditions in this locality, and to suggest that, if cultivated, it would succeed.

Baboo G. Mohun Tagore does not think that any of the experiments as yet instituted were on a scale sufficiently large to warrant any practically useful conclusions being drawn from their results.

Mr. A. H. Moore confirms most of Mr. Hill's statements, and generally agrees with the view he takes of the question. He prefers Sea Island to all other varieties for cultivation in the Soonderbunds, and he urges the dangers of the low, and the advantages of the higher, situations.

He believes, however, that Cotton grown by paid labor will never be made a remunerative crop in the Soonderbunds. When more villages are settled, or in parts now sufficiently inhabited, he thinks the crop might be profitably raised on the system of advances; and he recommends a trial of land which has been under cultivation for several years, and suggests that such land might be tried with advantage on the banks of the Pialee and Bydyadurrie Rivers.*

In 1861 the Commissioner of Nuddea reports that the Soonderbunds are stated to offer many eligible sites for Cotton growing: he specially recommends the Islands of Burra and Chota Basdea and part of the main land in their vicinity, the tract north of Chaplee as far as the Gullacheapah River, and the banks of the Barrisur, Baliser, and Baskhali Rivers, in Backergunge.

24-PERGUNNAHS.

This district, which includes Calcutta, extends westwards from the Hooghly, and lies north of the Soonderbunds: it is entirely within the area of the delta alluvium: probably the Cotton-growing capabilities of the district have, in past times, attracted more attention than they ever will do again, as it is not perhaps likely that extensive cultivation for export will ever be tried within its limits.

The earliest experiment of which I have found any record was made by Lady Hastings, in 1823. Seed obtained from Barbadoes was tried, and was sown at Futtehpore near Barrackpore: it was supposed to be that of a Brazilian perennial variety. Samples of the Cotton raised were sent home. Among these specimens there was found such a mixture of very fine long-stapled Cotton, with some of short, harsh fibre, as to suggest that some mistake had been made in the picking, that

---

* For fuller reports of the views and statements of the gentleman quoted in the text, the reader is referred to the Journal of the Agricultural Society, Vol. XI.

CSL

unripe had been picked along with ripe pods, or else some common country Cotton taken in with exotic: it had, moreover, been very badly cleaned.

As it was, it was stated to be worth 8 to 8½*d* per lb.: best Bengals being then worth 6½*d.* and best Surats 8*d* per ℔.: but well picked and cleaned, the samples would have been valued at a very much higher rate.

A somewhat detailed narrative of the experiment commenced in 1830, at the Akra Farm, will be found in the second section of this volume, to which the reader is referred.

In 1831 Mr. J. Hartie* sowed at Barrackpore some Cotton seed of the Pernambuco variety, which throve well and was picked in April 1832.

Mr. Willis examined samples of this Cotton and pronounced it to be inferior to the Pernambuco of commerce,to the extent of 1*d.* per lb. or thereabouts.†

In 1836 Dr. Huffnagle sowed some Upland Georgia seed at Cossipore, which grew very well: he picked a second crop from his plants in 1837: samples of both crops were submitted to the Cotton Committee of the Agricultural Society: they were thought very highly of, and were sent home.

The London brokers pronounced them to be only a shade better than ordinary Surats, and valued the Cotton at 7½*d.* per lb. when middling Upland Georgia (of American growth) fetched 8½*d.* per lb.

In 1836 Mr. J. Bell ‡ sowed in his garden in Calcutta some Egyptian Cotton seed during the month of April: when the young plants were just beginning to blossom, he was forced, in consequence of a change of residence, to have them transplanted to the country:

---

* Agricultural Transactions, Vol. II., page 120.

† Ibid, Vol. VI., page 109.

‡ *See* Journal of the Agricultural Society.

they suffered severely under the operation, and were considerably thrown back, but subsequently revived : when a new set of buds were once more just beginning to form, through misinterpretation of an order he had given, his gardener transplanted again : on this occasion, however, they were only moved from one side of a tank to the other, and the plants did not seem to suffer in any way from the change, save that their growth may have been temporarily checked by it : they ultimately bore a fair crop.

Samples of the Cotton, which were submitted to the Society, were thought very fine indeed.

In 1838, at a meeting of the Agricultural Society, the Secretary stated that some Peruvian Cotton seed, which had been presented to the Society by Mr. J. Cooke, and been distributed by them, had, with one or two exceptions, failed : Mr. Cooke stated in explanation that the seeds had reached Calcutta in June : that he had retained two seers for himself, which, at the close of the rains, he sowed at Ishera : this sowing had failed : but on their first arrival he had put 40 of the seeds in the ground in his garden in Clive street (Calcutta) : these germinated and throve well : they grew vigorously, and had attained a height of 15 feet within the year ; they yielded abundantly, and he had at the time about a biga of land under Cotton, the produce of seed obtained from the original plants.*

In 1843 Mr. Speede † made an experiment with some Tenessee Cotton seed on the banks of the Babookhall : the soil he selected was alluvial, and subject to annual inundation, but at the time defended by an embankment : he sowed in the rains, and was unable to pay much attention to the crop. He found that the shrub had a tendency to "run to weak, lanky shoots," which bore small unhealthy or abortive pods, and that these were much subject to be attacked by insects. When

---

* Agricultural Transactions, Vol. V

† Agricultural Journal, Vol. II., Part 2, page 62.

CSL

well pruned, however, the plants readily took a different habit of growth: they threw out strong, healthy, lateral arms, producing sound full pods, and these were not (like the others) touched by insects.

In May 1844* acclimated New Orleans seed was sown in the Society's gardens near Calcutta. A member of the Society stated the samples of this crop to be very fine; he thought that the seed, after having grown for three years in India, yielded Cotton superior to that which had been picked as its first crop; that the present sample was improved in length and in strength of staple as well as in softness; that it was at least equal to "good fair" New Orleans of American growth, and that it resembled some of the long staple varieties of Cotton in the readiness with which it separated from its seed.

He further stated that he had made experiments which convinced him that New Orleans seed planted here, after a few years, "actually verged upon a long-staple Cotton," not only in the ways already mentioned, but also in the deepened color which its seed assumed, which became nearly black. Finally, he stated his belief that he could, by careful treatment of the New Orleans seed, through a sufficient number of seasons, succeed in producing a perfect specimen of long-staple Cotton.

Dr. Huffnagle concurred in the above estimate of the value of the Cotton, and said that, had he not been informed to the contrary, he would have supposed the sample to have been of American growth.

In 1848 some of the Coimbatore acclimated Mexican seed was sown in the Agricultural Society's gardens near Calcutta. No manure was used, and the seed was treated in the native manner, and sown broadcast: it was once weeded and hoed, and subsequently the grass was *cut* away from about the plants, but not pulled up or hoed out. The plants were attacked and greatly injured by insects: they were sickly and ill-conditioned, and irrigation was tried in December without any good

---

* Agricultural Journal, Vol. III., Part 2, page 66.

CSL

result. In May 1849, they were all taken up and transplanted; after this they did better, but the yield was ultimately small: the quality was however good, and the samples were valued at 5*d.* per lb.

In 1856 there were submitted to the Cotton Committee of the Agricultural Society samples of Sea Island Cotton grown in the Society's gardens: one, of the crop grown in 1854; one, of that grown in 1855; and a third sample for comparison, namely, some Cotton of the same kind grown in 1855 in America. The general impression was, that a very decided deterioration had obtained, and that the degeneracy had been rapid.

The official returns of 1848 merely state that, in the Soonderbunds and the 24-Pergunnahs, no Cotton is grown.

In 1857 the Commissioner repeated the statement, and in 1861 the name of the district does not appear in the reports.

NUDDEA.

This district forms the northern part of the Division of the same name: it is, as stated above, entirely within the Gangetic Delta.

In the returns of 1790 it is twice mentioned. The Resident at Santipore states that the annual crop amounts to 1,100 mans; that the quality of the Cotton grown for the factory was much superior to that of any imported from the North-west of India; but that the crop was much more troublesome in the cultivation than most others, and not more remunerative.

The Collector stated the annual crop to reach 30,000 mans: the former officer probably referred to some sub-division, which he did not think it necessary to define, and which may be included in the latter estimate.

In 1836 Mr. F. Harris grew some Cotton at Kishnagur from Egyptian seed. The samples of his crop, which were submitted to the Cotton Committee of the Agricultural Society, were pronounced to be of very bad color, and although the staple was of fair length, &c., compared with

CSL

Indian kinds, its inferiority was very decided when compared with the same kind of Cotton of Egyptian growth.

In 1858 Mr. Schurr sent to the Agricultural Society specimens of a Cotton which he stated was grown to some extent by the villagers in his neighborhood; that it was not the Cotton of the country, but had been growing about there for four or five years: the people say they can't clean it without very great trouble, and that, when cleaned, they could not spin it into thread.

The Cotton Committee pronounce it to be the produce of New Orleans seed, a good useful Cotton, of fair staple, and readily saleable at 6*d.* per lb.

It would appear that had this Cotton met the requirements of the people, it might have been as perfectly acclimatized as the Mexican Cotton has been in the Rajmahal hill district.

In the returns of 1848 the Collector estimated the Cotton crops of the district at 2,000 bigas, and thought that it might be extended to 4,000 bigas: the average yield per acre was high (160 lbs)., and the price of imported Cotton was 3·5*d.* per lb., that grown being all for home consumption.

In subsequent official returns no mention is made of the Nuddea district.

JESSORE.

This district lies west of Nuddea and north of the Soonderbunds, and forms the western side of the Division.

In 1790 it was stated to grow annually 2,400 mans of Cotton: the driest soils were employed, and the quality was at least equal to any of that imported into the district.

I find no further mention of Jessore in connection with the cultivation of Cotton until 1860, when samples of Cotton grown there in the previous year, by Mr. H. G. French, from Pernambuco seed, were examined in Calcutta, and pronounced to be very fine indeed, and valued at 1½*d.* per lb. above the "standard middling New Orleans" of commerce.

CSL

BURDWAN DIVISION.

Districts.
BEERBHOOM.
BURDWAN.
BANKOORA.
MIDNAPOOR.
HOOGHLY.
HIDGELEE.

The Burdwan Division includes all along its western side a strip of the upland area, between which and the Hooghly River, which forms its boundary on the east, there stretches a rich plain of the Gangetic alluvium: on the south it reaches the sea coast.

In 1857 the Commissioner reported that there were supposed to be only 22,524 acres under the Cotton crop in the whole of his division, and this lies mostly off the alluvium, and on the lower slopes of the upland, or old alluvial area. In the returns of 1861 Hooghly alone of all these districts is mentioned.

BEERBHOOM.

This district lies, for the most part, on the lower slopes of the upland area; it formerly stretched far into the hilly country to the north of the limits which the map now assigns it, much of this portion being now included in the Sontal Pergunnahs: within the district, as it now stands, much fine alluvial land exists, and the red sand and gravel of the old alluvium occupies much of the surface, forming a transition between the low grounds and the rocky country beyond.

In 1790 it is reported that 20,000 mans of a kind of Cotton called *Boga* was raised in the district, and all spun there, the yarn and cloth were exported, but never the Cotton itself.

In 1839* Cotton was grown in Beerbhoom from Upland Georgia seed, and some from seed of the New Orleans and Sea Island kinds also; of the way in which the experiment was conducted no record has been found. Samples were, however, sent to the Agricultural Society, and the Cotton Committee reported on these.

The *Upland Georgia* was strong, fine, and silky, but short in staple.

---

* Agricultural Transactions, Vol. VI., page 100.

CSL

The *New Orleans* was considered a fine specimen.

The *Sea Island* was found to be very short in staple, and if the seed really was of the kind stated, the degeneracy was remarkably great.

In 1847 some of the Coimbatore Mexican seed was tried near Soory; its culture was carefully attended to, but heavy rain in October ruined the crop. The sample sent to the Agricultural Society was found to be soiled and damaged, and not worth more than 2½*d.* per lb.

In 1848 the cultivation consisted of 1,500 bigas, and the Collector thought that it might be extended to five times that amount: it required the best lands, "where the means of irrigation were handy"; the yield per acre is stated to be above 200 lbs. of clean Cotton, and the price about 2*d.* per lb.

In 1849 the Coimbatore Mexican seed was again tried*; it was sowed in a soil "called *buloa* in that part of the country;" was carefully tended and irrigated; but it did not thrive, and like the former crop, suffered materially from rain late in the season.

In 1857 the Commissioner states that the soil used for Cotton in Beerbhoom is always "hard and dry." The ground is in some places rocky, and the soil often contains kunker; the surface is undulating and well drained, and the atmosphere is dry; the cultivation is carefully carried on; irrigation is often had recourse to before ploughing, and is occasionally applied subsequently: from January to March the crop is weeded, and the plough is sometimes used between the rows of plants in March; about that time blossoms begin to appear, and in May picking begins: it lasts here, on the highlands, far into the rainy season: the yield is from 120 to 240 lbs. per acre of cleaned Cotton: no insects are known to attack the plant, and hail and heavy rain are the only dangers feared.

---

* Agricultural Journal, Vol. VII., page 205.

GSL

BURDWAN.

This district includes more of the alluvial, and less of the upland area than Beerbhoom ; in other respects they are similarly situated : both are very fertile and the railway offers the same facilities to each.

In 1790 three kinds of Cotton are stated to have been known in the district, and 50,000 mans of clean Cotton to have been annually raised : the *Nurma,* which here (though by no means generally in Bengal) was the choice variety, grew only on the high grounds : the growers wove their Cotton, and sold it only as yarn.

In 1848 the Collector reported that the Burdwan Cotton was of a very inferior quality ; he said that Mirzapoor Cotton was much used in the district ; that 16,000 bigas were annually under the crop, and that the yield per biga was large : the area of cultivation could, he believed, be doubled, were the produce in demand : and the fact that it is not so, he attributes to the bad quality of the produce.

In 1857 the description of the cultivation and its results, as given for Beerbhoom, is stated to apply equally to Burdwan : the ground is well ploughed and manured in October, and the crop treated as above described : it seems that in Burdwan it is common to use as a manure for the Cotton crop, the black earth dug out of tanks and taken from the vicinity of houses, and also that deposited in low grounds by the flooding of rivers.

BANKOORA.

This district, in all essential points, resembles Beerbhoom and Burdwan ; it extends further than either into the upland area, includes less of the alluvial flat and its rich soil, and is somewhat less favorably situated as to means of transport : the returns of 1790 record of Bankoora that the manufactures of Soonamookee were notoriously of a very coarse description ; that no fine kinds of Cotton were required there, that in the district none of the choice varieties were grown, and that the crop was considered precarious.

CSL

In 1848 there were 18,000 bigas under the crop, which the Collector thought might be extended to 25,000 bigas. The yield per acre is very high, and the average price 2·5*d.* per lb.

The account given in 1857 of Beerbhoom and Burdwan, applies equally to Bankoora.

MIDNAPOOR.

This district is much more varied in its physical features than those above described: the upland portion of it is identical in general conditions with the similarly situated portions of Burdwan; but it includes a wider area of the alluvial flat, and reaches down to the sea at the mouth of the Soobunreeka River.

It is mentioned in the returns of 1790 as growing three varieties of Cotton. The annual crop was estimated at 11,000 mans, and it was supposed to be the least remunerative crop of all those cultivated in the district.

In 1842 some Cotton grown in Midnapore, from Pernambuco seed, was submitted to Mr. Willis for examination.* He considered it "middling to fair good" Cotton: a little unequal in fibre, but mainly of good length and fineness; it was slightly discolored, and worth 7 to 6½*d.* per lb.

In 1848 the Collector remarks that when there was a Commercial Resident at Radanagore, there was a considerable growth of Cotton in the district to supply the then existing demand for cloths which were at that time exported from this country: and he thinks that if there were a ready market for Cotton, its cultivation would be extensively introduced as the exportation would not be attended with much difficulty. He estimates the area then under the crop at 3,490 acres, and states that there are 300,000 acres of land in the district capable of growing Cotton: besides which, he believes that some of the jungul lands to the west are well suited to the plant: the yield per acre was high: all the Cotton grown was for local consumption, and a considerable quantity was imported from Calcutta, and the marts on the river: the price was then from 3*d*. to 4*d*. per lb.

---

* Agricultural Journal, Vol. I., page 37.

In 1857 it is stated that the soil preferred for this crop is a dry sandy clay: Cotton is, however, grown in "the lower parts of Midnapoor, near the "sea, which are very damp. But, nevertheless, irrigation is found "necessary from December to May"; in the low country, the picking which commences in May and does not last so long as in the northern part of the Division, as above described for Beerbhoom and Bankoora. Cow dung and ashes are here employed as manure, and sometimes sand is so used.

HOOGHLY.

This district includes a small area of the upland tract, but is essentially an alluvial district; some of the Coimbatore Mexican seed was tried in Hooghly; a portion, which was sowed on a chur,* utterly failed: a portion was also sowed in a garden: this was kept alive by constant watering: the plants, however, ultimately became healthy, and were very prolific: and the sample sent for valuation to Calcutta was pronounced to be fair good Cotton, and worth 5*d*. per lb.

In 1848 the Collector reported that the cultivation then consisted of 9,000 bigas, and might probably be doubled in the event of an increased demand: the yield per acre was high, and the average price 3*d*. to 3½*d*. per lb.

In 1857 the Commissioner says that, as in Midnapoor, a dry and sandy soil is preferred: large portions of the district are subject to annual inundation from the Hooghly, Damuda, and Roopnarain Rivers: the system of cultivation is the same as already described, and the general results identical.

It is stated that in 1861 "only a few bigas in the sub-division of Jehanabad are cultivated with Cotton, which is used up on the spot."

---

* Annually inundated low ground.

GSL

HIDGELEE.

This is an exclusively alluvial district, lying entirely within the Gangetic Delta, and stretching along the Bay of Bengal west from the mouth of the Hooghly River: swampy lakes almost every where separate the flat country from the range of low sand-hills, which runs almost continuously along the shore, and much of the ground is protected from inundation by artificial embankments: salt is manufactured in many places from the strongly impregnated sand and clay close to the sea, and saline impregnation is stated to characterize the immediate sub-soil to a considerable distance inland.

In 1790 the district is stated to have grown a small quantity of Cotton, principally in gardens near houses, and exclusively for local use.

No notice was taken of Hidgelee by the Revenue Officers, who reported on the capabilities of Midnapoor in 1848 and 1857: it was probably included in the general statements made in regard to that district. Nor have we found any experiment with exotic Cotton seed on record as having been tried here. The portion of the seaboard area on which Hidgelee lies, differs essentially from the Soonderbunds on the one side and the Orissa Coast on the other, in most of its physical characteristics; but we have no means of forming an opinion as to whether the land here would afford conditions favorable to the growth of any of the varieties of exotic Cotton.

CUTTACK DIVISION.

Districts.
BALASORE.
CUTTACK.
POOREE.
JUNGUL MEHALS.

This Division lies at the north-west end of the Bay of Bengal: it has a seaboard stretching from the mouth of the Soobunreeka, and the boundary of Midnapoor, southward to Ganjam, and it extends inland nearly as far as Sumbulpore: the seaboard is generally characterized by low sand-hills and undulating

CSL

sandy plains: the delta of the Mahanuddi spreads over a very large space, and an alluvial tract seems to extend from north to south all along behind the coast: the upland part of the division is in extent far greater than the plain, and in places approaches the shore: and although, as we shall find, that part of the country is supposed to present considerable advantages to the intending Cotton planter, most of it is covered with jungul, and thinly populated.

Balasore.

This district lies at the north end of the division; it includes a long stretch of coast, a broad tract of alluvial plain in its southern portion, and along its west side, part of the upland jungly country.

I have met with an allusion to an experiment made on the cultivation of some exotic Cotton in Balasore about the year 1826, but have not succeeded in finding any account of it: it was, however, considered unsuccessful.

In 1848 the Collector stated that there were about 1,485 acres of land annually under Cotton in the district, and that he did not think the cultivation could be extended: the yield per acre is said to range from 68 to 240 lbs.: the price varies from 3·4*d*. to 4·8*d*. per lb.

In 1861 the Commissioner states that the Cotton raised in Balasore is insufficient for its local consumption, and that the deficiency is supplied from Sumbulpore: he adds, that "experiments made with "good seed, under European supervision, prove that the soil of Balasore "is not adapted at all to the cultivation of Cotton."

Cuttack.

This district may be said to consist of the delta of the Mahanuddi: it thus presents a flat alluvial tract stretching along the sea to the south of Balasore, and including a small part of the upland country to the west.

In 1832 Mr. T. J. Weeks* sent to the Agricultural Society samples of Cotton grown by him in Cuttack: he also sent a piece of cloth made from a part of his Cotton. He had tried Bourbon seed, and sown it at the commencement of the rains, on a poor sandy soil: no particular attention had been paid to the plants, which, in eighty-five days from the time of sowing, had flowered: they were eight years old when he wrote, and had in each year yielded Cotton during nine out of the twelve months: 320 plants occupied half a biga of land: at the beginning of each rainy season he cut down each plant to the height of 4 feet; by the end of the rains they had grown up again about 7 feet high: he had often transplanted the bushes without injuring them, and he stated his belief that they were hardy plants, and well suited to the soil and climate of this district.

Mr. Weeks appended calculations, based on his experiment, which seem completely to prove that the cultivation of the Cotton he tried might be made profitable: but it is not necessary farther to allude to these calculations, as the conditions of price, &c., to which they refer, have changed; besides which, the spinning of the yarn and weaving of the cloth, are included in his estimates.

Mr. Pringle† subsequently tried Sea Island Cotton in Cuttack; he stated that he had entertained fears for the ultimate success of his crop, until a storm occurred, which apparently utterly destroyed the plants, but after which they, on the contrary, revived and grew well, ultimately yielding a large quantity of Cotton.

In 1839 the Agricultural Society's Cotton Committee reported on several samples of exotic Cotton grown in Cuttack.

Upland Georgia.—The sample was pronounced to be very bad; it was dirty; and had been carelessly picked.

Peruvian.—This sample was thought a very fine specimen; it was somewhat harsh, but both long and strong in staple.

---

* Agricultural Transactions, Vol. II., page 110.

† Ibid, Vol. II., page 125.

In 1848 the Collector stated that there were 10,000 acres of land under Cotton cultivation, but were "sufficient inducement offered, the "cultivation could be increased a hundred-fold: the cost of clean Cotton "is, however, now equal to 4½*d.* per lb. in the district, and the additional "charges of carriage to Calcutta, shipment to England, &c., would "raise it above the selling price of New Orleans Cotton in England, and "thus preclude any chance of competition."

The average yield per acre was stated at 190 lbs., and the Cotton grown was certainly not more than sufficient for local demands.

The Collector, in addition, stated his belief that "American Cotton would probably grow most luxuriantly" in Cuttack: Deputy Collector Brinjosoonder Roy had then some thirty or forty Cotton bushes, raised from Georgian or New Orleans seed, which he had obtained from Mr. R. Hunter in 1832: some of the bushes then standing were fifteen, others six years old, and they had produced three crops annually, without cultivation, irrigation, or labor of any sort being bestowed on them: relatively to the area the plants occupied, each of these crops was much larger than an ordinary crop of indigenous Cotton; and the Cotton itself is "beyond all comparison superior."

The Commissioner, in 1861, states, that Cotton is grown in many of the pergunnahs of the Cuttack district, mostly for local consumption, but also to a small extent for export: it is taken towards Calcutta on bullocks. It is supposed that with greater facilities for carriage, and increased means of irrigation, the cultivation could be "extended fifty or sixty-fold." The price is now a little over 4*d.* per lb.

POOREE. Pooree district lies south of Cuttack, and is in general characters similar to it.

I have not found any experiment recorded as having been made within the district.

In 1848 the Collector reported that the quantity of land under Cotton cultivation was about 10,390 bigas, and that an increased demand might, it was thought, extend the crop to 500 bigahs more: that the soil was not generally suited to Cotton, and that the heavy cost of land carriage would prove a bar to its cultivation for export: the cultivation was at that time barely, if quite, equal to local consumption.

The Commissioner, in 1861, states that the quantity of Cotton grown in Pooree is so small, that the supply falls far short of the demand: all that is raised is used in the district: and even if the cultivation were increased, the expense of exporting it would swallow up all possible profits.

JUNGUL MEHALS.

These pergunnahs extend to the west from the western boundary of Balasore, Cuttack, and Pooree; they lie within the upland area, and form a part of a very varied and broken tract of country, which extends hence to what is generally spoken of as the Deccan.

Forests, junguls, and grassy land, rocky hills and undulating, or plain tracts, are all included in these districts.

The Commissioner, in 1861, says, that the Sumbulpore country offers a fine field for Cotton cultivation; Cotton is now largely grown there: certain tracts are recognized as of special fertility: " the country on the " right bank of the river, (Mahanuddi,) and including the Bara Pahar " Sonpore, is more productive than the country on the left bank, from " Padampore to Rarakhole, in the ratio of two to one. Chunderpore, " Saragon, Surswa, and Chateesghur also give a very large yield of the " staple."

Thousands of acres of land well adapted to the plant, now lie waste, and such land as it is supposed would reward the application to it of the most careful cultivation.

Merchants from the marts on the coast annually visit the Sumbulpore district, to purchase the Cotton from the growers: they buy the raw produce in seed: in 1860 the price of this seed Cotton was 0·68*d.* per lb.: this year it could be bought for 0·57*d.* per lb.: Cotton bought raw at

CSL

this last rate would have, when cleaned, cost the purchaser 2·14*d.* per lb.

From half to three-fourths of the total crop of the district is in this way exported : that which is destined for Cuttack is conveyed on carts and bullocks to Binka and Sonpore, on the Mahanuddi, and sent from thence in boats down the river : Cotton for Jhajpore and Balasore has to be carried on the back of beasts of burden from the town of Sumbulpore across to Talchir, and thus on, across the hilly country towards the coast : these tracks are stated to be at present impassable by carts, but it is believed that a trifling outlay would make them good fair-weather roads.

Since Sumbulpore has come under British rule, the Cotton crop is stated to have more than doubled, and "a much further extension of "the cultivation may reasonably be expected if the roads through the "tract were improved and increased in number."

DACCA DIVISION.

Districts.
DACCA.
FURREEDPORE.
MYMENSING.
BACKERGUNGE.
SYLHET.
CACHAR.
JYNTEAH.

The Dacca division reaches to the sea at the south of the Backergunge district, stretches thence northwards along the Ganges and Bramaputra Rivers, including both banks of each for many miles, and also extends far towards the east, so as to include the Sylhet district, from the hills of the Garrow, Khasi, and Jynteah country, on the north, to those of Independent Tipperah on the south. The division has thus a little reach of seaboard, is mostly made up of the alluvial flat of the delta, and also takes in considerable spreads of the higher undulating grounds of the old alluvium.

Mr. T. Allan Wise addressed the Judge of Mymensingh, in June 1860, on the subject of the cultivation of native and foreign Cotton in Eastern Bengal, and especially in this division.*

---

* I have quoted Mr. Wise's words, but not re-produced his letter in extenso.

CSL

"In former times these districts, and more particularly Dacca, were "famous for their Cotton, but now little is grown in Bengal comparatively; each year sees less produced, and in many parts, where formerly "large tracts of land were sown, the plant is hardly known. The "looms of England now-a-days enable the merchant to supply thread "and cloth to the people at such a low rate, that the same quantity of "Cotton for the villages is not required, and, consequently, less is sown: "and, besides, the value of all other crops has risen so much, that the "cultivators find Cotton a less profitable crop than safflower, rice, &c.: the "only reason I can get for the ryots not cultivating more Cotton is that "it is a very laborious crop to raise. It is also liable to be injured by "long droughts, by hail-storms, insects, &c., while the profit from it is so "small that it is not considered worth the risk run by cultivating it. At "Sat Mozil to the west of Dacca, Capassia to the north, Sonergong, "Berhampore, &c., large quantities of Cotton were formerly produced; "and even of late years small quantities that have been sent from those "places have retained for them the character of having Cotton of a "very fine staple. Little, however, is grown now in the plains of these "districts, for by far the greatest quantity brought to the bazars has "been grown in the hills of Cachar, the Garrow range, and in the "mountains of Assam. Every village almost, however, can show a field "or two of it; but in comparison to former times, the quantity is small, "and rice, mustard, &c., have taken its place as being more certain, "more easily produced, and more profitable.

"In speaking of Indian Cotton, people generally regard it all as one "species; this is a mistake, for I can mention nine varieties, differing "from each other in length and fineness of staple, size of plant, and "fitness for different soils and localities. Perhaps by proper cultivation "some of these may prove at a future day of very great value.

"The *Sheraj* Cotton is entirely a hill species, brought from Assam, and "probably the western hills of the Garrow range; it is considered the

CSL

"second best Cotton brought to the Mymensing bazars. The *Bogga* "Cotton is very coarse, and comes from the hills of Assam and Rungpore: this is probably the Cotton grown in Cachar."

Mr. Wise calculates that this Cotton could be laid down in Calcutta for $2\frac{3}{4}d.$ per lb.

"*Borailli* is the finest Cotton procurable in these marts: it is the "largest Cotton plant I know, reaching to the height of 8 or 9 feet: "it is perennial, but it only grows in high village land, quite clear of "inundations: it bears pods every month in the year, for three or four "years in succession.

"Dacca district, for the greater part, consists of the alluvial deposit "of Bengal: the soil is of a lighter kind than most of the surrounding "districts: to the north of Dacca a different kind of soil exists, consisting of a reddish clay, which is little cultivated, so that vast tracts "of land in the district are now covered with dense jungul, which were "once the scene of industry and life. To the north-east of Dacca is "Capassia, also covered with jungul: quite independent of these wastes, "there is ample room for Cotton. Tipperah, Furreedpore, and Mymensing have each enough high fine land to supply any quantity of the "article.

"The Dacca Cotton loves rich, moist, alluvial, and chur soils, especially "such as are inundated every year: it is sown in ridges, between which "chillies and garlic are grown.

"Dacca *Tangori* Cotton is grown on high land, in a red clay soil, to "the north of Dacca: it bears a light crop for three or four years."

Speaking of the common Bengal Cotton, Mr. Wise says:—"The "Dacca Cotton, as I have mentioned, grows on low lands, but this refers "only to the fine kinds peculiar to the neighborhood of the station, while "the indigenous Cotton of Dacca, Mymensing, &c., is a very different "plant: it is an annual: the lands it is chiefly sown in, are high, and "clear of inundation, or nearly so: the soil neither a very rich, moist

CSL

“ kind, nor a very light one: manure or irrigation the natives do not
“ give the plants, and a long drought in May or April greatly reduces the
“ returns from the fields: hail-storms and insects damage the crop, but,
“ worst of all, it costs the ryot too much trouble, and this is the real
“ reason it is not cultivated so much. The ryot can get instead of one
“ crop of Cotton, two from his land, one of rice, and one of mustard,
“ which, now that the value of all the products of India has so
“ increased, remunerate him very much better. Foreign Cotton does
“ exceedingly well.”

Reviewing Mr. Price's experiment, Mr. Wise quotes that gentleman to the effect that Dacca is well adapted for the growth of foreign Cotton, and adds, “ in this I quite agree, and what may seem paradoxical, I
“ distinctly say the experiment succeeded.”

He describes experiments which he had seen.

In 1849 about a tenth of an acre was sown in his garden with New Orleans seed: the soil was moderately good: but subject to inundation during high floods: the plants were never manured or irrigated, yet year after year they were loaded with bolls, and bore abundantly: outside the garden about 30 acres were sown with the same New Orleans seed. The land was in parts subject to inundation during a high flood; the soil was rather light and not rich: it was neither manured nor irrigated, cattle were permitted to stray into it, and part of it was almost overgrown with jungul.

Mr. Price, when he inspected this crop, declared that he never saw finer Cotton, and that it was as good as any he ever looked at in New Orleans.

Mr. Wise gives a table, showing cost and profit of seven of the common crops of Eastern Bengal, from which it appears that this profit averages Rupees 2-5 per biga: this is a low rate, and Mr. Wise suggests that exotic Cotton might easily be made to surpass it. He tells us, however, that in consequence of the rapidity of their growth, certain

CSL

crops permitted more than one kind of return being obtained from the same land within the year: so that the average profits may fairly be taken at Rs. 3-3 per biga, or about 19 shillings per acre. He adds :—

"I am not surprised at the cultivation of Cotton being abandoned "now that the price of almost every product is double what it was "five years ago."

Believing that the Cotton now grown in Dacca and Eastern Bengal generally cannot reach a price which would again place it on an equality with other agricultural staples, he concludes that foreign kinds of Cotton must be had recourse to, and among these, not the varieties like Georgian, whose quality is only a little beyond that of good Indian Cotton, but the very finest and most highly priced kinds.

Before leaving Mr. Wise's paper, the information which the table alluded to contains may be put in another light: thus rice is stated to cost for rent and other charges (per biga) Rs. 3-8 : the clear profit being Rs. 2-1 : sugar in the same way to cost Rs. 39 : profit being Rs. 5. Again he calculates that rice and mustard, which may, within the year, be sown on the same plot of ground, jointly yield a profit of Rs. 3-3, in his table they are stated to cost in cultivation Rs. 5-6 ; we thus find that in the case of sugar the profit *on the outlay* is rather less than 13 per cent., on rice a little more than 58 per cent., and on rice and mustard together, a little over 59 per cent., calculated on the outlay in each case. He subsequently estimates that on the cultivation of fine exotic Cotton the profit would be Rs. 64 on an outlay of Rs. 20, namely, 320 per cent.*

DACCA.

The Dacca district is essentially alluvial: much of its surface is annually inundated, but there are certain portions of it where the older alluvium would seem to have resisted the denudation to which it has been

---

* I have appended these figures as I find the results of analogous estimates and calculations elsewhere stated in this way; and because, without affecting the statements themselves, it seems to put the relations of profit and loss in a strong light.

CSL

exposed, and still appears at the surface, forming patches and ridges of higher land. I conclude that this is so from the description universally given of the soils of these higher portions of the district, which exactly corresponds with those elsewhere recorded of the older alluvium clays. The opinions recorded in reference to the ground on which the finest of the Cotton grown formerly in the Dacca district was raised, exhibit some discrepancies: thus Mr. Bebb asserts, that the finest was all grown to the east and north of Dacca itself, and that the Cotton grown to the south was considered inferior; Mr. Lamb, on the contrary, tells us that the Cotton from which the finest muslins were made all grew on the banks of the Ganges and Megna, near, and at their junction, that is, south of Dacca.

In the returns of 1790, a ridge of high land running along the bank of the Megna is named as the area to which the plant bearing the finest Cotton was rigidly confined. Mr. Bebb speaks of the land selected as "high and dry."

Mr. Dunbar says it was free from inundation, and in one place he approves of one of the localities which Mr. Price selected for his experimental cultivation, as possessing many of the characters prized by the planters of the finest Dacca Cotton, *although* it was subject to inundation occasionally.

At the same time we find Mr. Wise, above quoted, saying that the finest kinds of Dacca Cotton grew on chur lands, and affected a rich moist soil; and Mr. Lamb, in a memo. describing this same finest Dacca Cotton, says that one of the calamities to which it is subject is, that if the river rises early in June, as sometimes happens, the plants are smothered before the crop is picked.

From Mr. Price's statements absolutely nothing can be gleaned either as to what was considered the best Cotton ground in his time or before it, not even what he himself thought the best, for he not only praised, but actually planted Cotton on every variety of ground within his reach.

CSL

He thought the soil near Luckypore adapted to his purpose, because it was "light, sandy, and low." He approved of soil along the banks of the Bunsee River, because it was "well raised above the water level, "and composed of two-thirds stiff red clay and one-third sand and "marl." In the Kapassia country (Dacca district) he found the same stiff red clays: the Cotton could not be sown until rain had fallen and softened the ground for the plough. In the Pergunnah Casseepore, along the Banar River, and near the Bramaputra, "the higher grounds, "which look like suitable for Cotton," are all of the same stamp. He, however, also praises the soil of the chur land, "which is free, and easily cultivated at all seasons of the year."

With regard to Mr. Price's experiment, of which an account will be given in the second part of this volume, I may here remark, that it was indeed a failure in every sense: it not only failed in attaining the object which the experimenter tells us he set before himself, namely, to prove to the natives that fine kinds of exotic Cotton could be profitably grown in the district, but it failed in turning out any Cotton whatever, at any cost of production, of which the quality was approved by the English brokers: and, worse still, it failed to establish any fact as to what varieties of seed were suited, or if any were suited, to which, if any, of the many localities tried: Mr. Price encountered many difficulties, no doubt, not one of which, however, he succeeded in either overcoming, or evading. At the close of the experiment, Mr. Commissioner Dunbar, who was, throughout its career, greatly interested in its success, informs Government that its history does not establish any one fact of general interest, certainly not that the Dacca district is incapable of growing exotic Cotton.

Mr. J. P. Wise* told a Parliamentary Committee, in 1858, that Mr. Price had failed from causes quite independent of the natural conditions which affect the question of exotic Cotton growth in Dacca, and insists that it would be practicable to cultivate such Cotton profitably. We have seen that Mr. T. A. Wise speaks of the failure of Mr. Price as not interfering with his belief that the finest varieties of the plant can be grown. And, finally, the Lieutenant-Governor of Bengal has lately stated, in reference to Mr. Price's career in Dacca, that "it is not to be "taken for granted that this experiment of cultivating American Cotton "at Dacca was so well conducted as to be conclusive."

---

* Colonization Committee Question, 2,679—2,760.

Mr. Bebb in 1790 describes the Cotton trade of Dacca up to his time. He says that the variety called *Phootee* was that which furnished the finest yarn.

In these old returns the way in which the local names of varieties occur is very contradictory: this one appears nowhere save in Dacca, but elsewhere the finest of the Dacca kinds is spoken of as *Bhyratti;* it was so described in the order given for its experimental cultivation throughout the Cotton-growing districts of Bengal: and in many of the reports of that date, the finest kind grown in the place described, is called *Bhyratti:* elsewhere it is said to be inferior to, and cheaper than, some other kind, *Nurma* for instance; but this again is often spoken as a second-rate kind.

Mr. Bebb says that this *Phootee* was ranked first by the Dacca spinners in his time: that its special excellence was a quality which it possessed of not swelling in the bleaching process, and it was found that this property existed in its highest perfection in the crops raised near certain villages (which he names) lying to the north and east of Dacca City, on slightly elevated ground, whereas that grown to the southward swelled slightly: all the Cotton of this variety grown anywhere in the neighborhood was, however, considered superior to, and bore a higher price than, any other offered for sale in Dacca.

Next in order came that imported from Surat: I find it elsewhere stated that this was first brought to Dacca in 1783, but Mr. Bebb does not mention the circumstance.

CSL

The *Serongee*, a Mirzapore Cotton, was very nearly as good as Surat, and after these came the *Bhoga* and other coarser Bengal-grown kinds.

The cultivation of the *Phootee*, although profitable to the landlords, was not so to the actual growers, who, Mr. Bebb says, were "ground down until only a bare subsistence was left them."

The greatest care was taken in selecting a suitable locality for sowing. "The seed of the Cotton used by the spinners will not do for sowing; seed "for sowing must be kept in its surrounding Cotton, and when gathered "from the plant, must first be well dried in the sun, then put into an "earthen pot, in which ghee or oil has been kept; the mouth must be "carefully closed, and thus preserved until sowing time."

He gives the following account of the manner and cost of cultivation for one-third of an acre :—

	Cawns of Cowries.	
Nine laborers to clear and dress the ground	4	8
Seed	3	0
Sowing the seed in rows 18 inches distant from each other: the plants to stand 4 inches apart: seven men	2	8
Digging and breaking clods	2	0
Weeding four times	10	0
Cotton not ripening at one time, like other crops, but successively, must be watched attentively and gathered as it ripens: requires 15 days' labor...	7	8
Rent	5	0
Equal to Rs. 9-8	38	0

Thus of the outlay :—

Rent was about	13 per cent.
Seed	8 ,,
Culture	59 ,,
Picking	20 ,,

a fair average crop yielded 3 mans of seed Cotton, worth Rs. 12.

CSL

Taking one-fourth as the weight of the clean Cotton, this gives 180 lbs. per acre, worth 1·6*d.* per lb., neglecting cost of cleaning, which, in these returns, is either left out or stated to be balanced by value of seed.

The profit was about 26 per cent. on net outlay.*

This 1·6*d.* per lb. was the price paid to the grower, for we are told that this Cotton cost the spinners 3*d.* per lb., the difference being, I presume, the profit above alluded to by Mr. Bebb, made by the land-owners.

In 1831† Mr. G. Lamb presented to the Agricultural Society samples of the indigenous Dacca Cotton of the old fine variety: the specimens were very dirty, badly picked and cleaned.

He states that the Cotton from which the finest muslin used to be made was grown on both sides of the Megna and Ganges, near their junction. The plant is an annual, and prefers a rich soil: it is sown in October and November: when five or six inches high, it is hoed, and frequently weeded during its growth: it is picked in May and June, and when sown out of reach of the inundation, a second crop is subsequently obtained: this is, however, very inferior to the first, both in quantity and in the quality of the fibre: the average yield is from half a man to two mans per biga (from 40 to 160 lbs.): it is liable to injury from insects, also from hail and rain storms, and sometimes, if the river rises early in June, the plants are smothered before the crop can be picked.

The cultivation was declining.

The Cotton intended for spinning the finest thread is separated from the seed by hand: and so inefficient an implement is the common churka of the district, that the separation of this very tenaciously adhesive seed can be very nearly as rapidly effected by hand as with its aid.

---

* See Mr. Wise's table of profit and cost of production, ante.

† Agricultural Transactions, Vol. II.

In 1838 Colonel Stacy sent to the Agricultural Society samples of Cotton grown by him at Dacca from *Pernambuco* seed, which variety he strongly recommends as well suited to the district, and producing a hardy and prolific plant.

The samples were greatly admired for their length and fineness of staple, and valued by the Cotton Committee at 11*d.* to 13*d.* per lb.

In 1839 Mr. Dearman sent from Dacca to the Agricultural Society, samples of what he considered to be a Cotton indigenous to the district: the plants which bore it had been standing for four or five years, and were then healthy and vigorous.

The Cotton was pronounced to be of very fine quality, but the Cotton Committee thought that the plants must be of the *Bourbon* kind acclimatized.

In 1844 some samples of Dacca-grown Cotton were submitted to the Cotton Committee. Some of these grown from *New Orleans* seed were pronounced to be of good staple and fine color, but a little harsh in texture, and curly. Some specimens of the best indigenous Cotton which accompanied the above, were said to be short, weak, and curly, although beautifully fine.

In 1848 the revenue officers state that there were in the district very extensive tracts—which, it was believed, could grow fine Cotton—then lying waste: that the country did not grow as much Cotton as it used to do, and that imported Mirzapore Cotton sold at 3½*d.* per lb.

In 1857 the following account is given of the Cotton crop of Dacca:—

"Low soft soil is generally selected for the Cotton crop; it yields a rice "crop, which is removed before October, and the ground is then prepared "for the Cotton: this soft, moist soil, which has been under water "from June to September, is considered very fertile: irrigation is "never employed: the Patna variety, introduced by Mr. Price, yielded "a good crop, when a light, soft description of soil was used for "planting it.

CSL

“The seed is sown in parallel rows, at a distance of two or three inches, the rows being eighteen inches apart: the seed, before sowing, is carefully picked, and after being soaked in water, well dried in the sun, and then mixed with earth: up to the time of flowering the earth ought to have been four times loosened and turned up about the roots of the plant, and as many times weeded: picking lasts from March to May: the yield per acre is said to be 80 lbs., of which 20 lbs. is given to the pickers as wages: no manure is ever used, and stalks are removed for fire-wood: when December and January are rainy, the plants are attacked by insects, but this is of rare occurrence.”

FURREEDPORE.

Furreedpore, or Dacca Jelalpore, as it is called on the revenue survey map of 1858, lies west and a little south of the Dacca district, of which it seems naturally to form a part: in all physical characters they appear to be identical: I have not met with any reference to those higher patches of ground formed by the old alluvium as occurring in this district: they may not, perhaps, stretch so far to the south.

No experiment on the cultivation of exotic Cotton appears to have been made in Furreedpore. In 1848 the Collector says that the crop was then cultivated exclusively for the use of the grower, who very seldom parted with it: the Cotton from Mirzapore sold for 4*d.* per lb.: it was thought that the cultivation would be considerably extended by an increase of price.

MYMENSING.

This district lies north of Dacca, and extends to the foot of the Garrow Hills; its surface is stated to be more varied, and for the most part higher. I have not found any record of experimental cultivation here, and the district seems to be seldom mentioned in connection with Cotton.

In 1790 two varieties of Cotton were grown in Mymensing, but only to a small extent, and the crop was generally considered as precarious

GSL

and costly in the cultivation: it was, moreover, liable to be injured by insects and blighted by drought.

In 1848 the Collector states that there was nothing in the district which could properly be termed a Cotton cultivation: "the sort of vagrant "cultivation which occurs, varies from year to year, and it is impossible "to say what quantity of land is under Cotton cultivation: an increased "demand for Cotton would not be felt in the district." The land where the Cotton was grown is stated to be on the Sherepore and Soosung Hills: this is said to be of very inferior quality, and to be sold, though rarely offered for sale, at 1·26*d.* per lb.: the imported Cotton costing about 3*d.* per lb. No mention is made of the district in subsequent returns.

BACKERGUNGE.

Backergunge extends from Dacca southwards to the sea, and includes a part of the Soonderbunds; some information relating to that part of the district will be found under the head of Nuddea division; it appears incidentally along with notices of the Soonderbunds of the 24-Pergunnahs: the Backergunge seaboard is stated to present great superiority over most of that to the west: it is higher, less swampy, more thickly inhabited, and better suited to the growth of Cotton.

In 1848 there were stated to be about 2,000 acres under Cotton, and it was supposed that the cultivation could be extended to about 6,000 acres; whenever the Cotton of the district was sold, it was always in seed: the only clean Cotton purchasable being that imported, principally from Mirzapore; of this the price is stated to be 3*d.* per lb.*

SYLHET.

The Sylhet district lies west of Mymensing, between the Khasi and Jynteah Hills on the north, and those of Tipperah on the south; it is, for the most part, alluvial, but also includes some undulating ground and the lower slopes of the hills.

---

* It is curious that at this place the Mirzapore Cotton should be sold in the bazars at a less price than is stated to be paid for it at several of the Ganges marts far to the north.

CSL

In 1790 two varieties of Cotton were known and cultivated to a small extent "on the low hills."

In 1848 there were supposed to be about 1,000 acres under Cotton in the hilly parts of the Latoo and Hingageea thannas: the Collector states that "the land of Sylhet is almost all too low and wet for Cotton cultivation."

At Sylhet the price of Cotton was 3·75*d.* per lb.

In 1857 the Collector states that "the soil on which the Cotton plants "are produced is on the tops of hills, and is a mixture of earth and "sand; it dries quickly after rain: the jungul is burned, and the seed "sown in holes, without ploughing, digging, or irrigation: the height of "these hills varies from 190 to 250 feet. The seed is sown in March "and April: the place is weeded in June, in July, and again in "September, when rice, which is grown between the Cotton plants, is "reaped: in October the Cotton plants are in flower, and the Cotton "has been all picked before the middle of December. The same piece "of ground is not again used for eight or nine years, when the process is "repeated; no manure ever used save the ashes of the burned jungul. "The Cotton is of a very inferior kind."

CACHAR.

Cachar lies east of the Sylhet district, and is for the most part higher ground; it is bounded on the west and north by the Kookee country, and the wild hilly junguls in that direction appear to be a continuation of those of Cachar itself.

In 1848 there were supposed to be about 700 acres under Cotton, and the crop for the coming season was estimated at about twice that area: the yield per acre is given at about 240 lbs.: seed Cotton alone was sold.

In 1857 the Superintendent reports that "the soil on which the Cotton plant is grown in Cachar consists of a rich red clay, considerably "mixed with sand, which is that of the principal hills of the district, "and also of the small ranges of hillocks which run through it. The

CSL

" cultivation lies on the slopes of these hills and mountains, such lands " being never inundated, although they are wonderfully retentive of " moisture: the hill tribes, to whom the cultivation is limited, raise " all that is necessary for their subsistence on the same fields which " produce the Cotton. The same hills and slopes are now in great " request for the cultivation of the tea plant. The soil, when left to " itself, produces dense jungul, and under cultivation is fertile enough for " any purpose; no irrigation is ever found necessary for the Cotton " crop. Several endeavors have been made to introduce Mauritius " and Sea Island Cotton, and other varieties, but without avail. " These varieties do not seem to suit the primitive mode of cultivation " to which they are subjected. The Cotton-bearing tracts in their " virgin state are covered either with glorious timber forests or dense " junguls of bamboos. The latter being more easily cut, are generally " considered better for the cultivation, but the former is also frequently " cleared for the purpose. Early in the cold season parties of " the Kookees and Nagas select good patches, and commence " felling the forest. Bamboos and small trees are cut off about " 2 feet from the ground, and stumps allowed to remain in the soil. " The large trees are ringed and allowed to die away. When a sufficient " space has been cleared, then they are left to rot on the ground, " and the few showers, combined with the continued dryness of the " cold season, renders them, by the month of March or April, as inflammable as gun cotton: the whole is then fired in several places. The " conflagration leaves on the ground a coating of ashes an inch or two " thick, and this is the only manure necessary to make these hills yield " crops of almost any kind. By the means of a small hoe the soil below " the ashes is mixed with them in the spaces between the stumps of " the felled trees and bamboos: these stumps serve to prevent the loose " soil and ashes from being washed away in the rains, besides facilitating " the re-growth of the junguls. The soil thus prepared, the seeds are

CSL

"dropped in, paddy, sugar-cane, tobacco, cotton, and cucumbers, all "growing in the same land. The harvest is reaped from September to "December, and the same ground is in many instances made to yield "for another year or two, after which it is abandoned: if the jungul "was originally of bamboo, it is ready for cutting again in seven years; "if timber forest, not for twenty or thirty.

"The Cotton seeds are put in irregularly but never nearer than 3 "or 4 feet apart: the whole cultivation is weeded three or four times "during the rains, and the Cotton flowers in July, and continues yielding till December; no calculations of yield or labor are attainable: no "manure used save the ashes; no irrigation required. An insect some-"times attacks the leaves, but does not much affect the crop. The plant "is subject to known diseases: and heavy rain, when the pods are ripen-"ing, ruin it."*

JYNTEAH.

Of Jynteah I find no account given; it is only once alluded to in any of the records to which I have had access, and then only to say that in physical conditions it resembles Cachar.

CHITTAGONG DIVISION.

Districts.
TIPPERAH.
BULLOOAH.
CHITTAGONG.

The Chittagong division is naturally divided into two distinct parts: Tipperah and Bullooah belong to Bengal physically, and lie north of the Bay and along the Bramaputra or Megna, while the Chittagong district lies south of Bengal, along the east coast of the Bay, and stretches far into the hill country beyond. The division thus includes tracts of seaboard, of alluvium, and of upland, and offers many varieties of soil, climate, and general conditions within its area.

---

* This interesting narrative has been here and there condensed, but the writer's words are adhered to throughout.

CSL

The Commissioner in 1848 stated that, as regards the plains within his division, he did not think any extension probable: and that the hill tribes all along the eastern side of it, from the north of Tipperah down to Arracan, cultivated Cotton in an extremely careless manner, mixing it in the same field with rice, melons, &c.

In 1861 the Commissioner states that the whole of this eastern and hilly portion of the division is "admirably suited to the culture of the plant," and has long grown large quantities of Cotton: "and the five rivers by which is it intersected afford cheap "and excellent means of communication with the various ports of "shipment."

TIPPERAH *and* BULLOOAH.

The area comprised in these two districts extends from Mymensing and Sylhet on the north, to the head of the Bay of Bengal on the south, lying between the Megna on the west, and the hill country of Independent Tipperah on the east.

In 1790 Tipperah was said to grow no Cotton, but 17,000 mans, brought from the hills to the east, were annually sold in the District. At Luckipore, in Bullooah, some Cotton of very fine quality was raised, and manufactured at that place into high-priced fabrics.

In 1848 the Collectors say that very little Cotton was grown, the supply coming from the hills to the east, the average price being 2·63*d.* per lb.

In 1857 the same account is given.

In speaking of the general characters of the Bengal seaboard and of the Soonderbunds, mention has been made of the islands of Sundeep, Hattia, and others lying at the mouth of the Bramaputra, and which fiscally belong to Bullooah: no details concerning them are found in any of the official returns, but there is some reason to suppose that they present some conditions favorable to the growth of certain exotic kinds of Cotton.

GSL

CHITTAGONG.

This district lies along the coast at the north-east end of the Bay of Bengal: it has a fine stretch of seaboard, and some fertile plains extend between the sea and the hills; the area of hilly country which it includes is considerable, and within it are said to be some most promising Cotton fields.

In 1790 two varieties were said to be cultivated for the factory in the plain, and large quantities brought down from the hills besides.

In 1845 Mr. Collector A. Sconce forwarded to Government a note on the Cotton of the district.

Cotton had long been cultivated: some used formerly to be grown for the factory, in the plains, but this cultivation had long ceased with the demand that had given rise to it, and little or none was at that time produced, save in the hill country.

Cotton was however still the great staple with the Joomeas or hill people, from the Fenny River on the north, which forms the boundary of Tipperah, to the Teknaaf on the south, which is that of Arracan. "A "hill side is cleared of surface wood; the land is neither ploughed nor "dug, and the seed is sown at the commencement of the rains. Rice, "gourds, pepper, and Cotton seeds are all dropped into the same hole, "and first up is first reaped: the Cotton is gathered in October, November, and December; the same place is only used for two or three years."

The amount of the crop is thus estimated:—

1843-44	93,610 mans.
1844-45	70,002 ,,

The average price throughout, Rs. 2-8 per man for seed Cotton.

"Commonly two-thirds of the gross weight is seed*; in some places "not only is the quality of the Cotton better, but the proportionate "weight of the seed diminishes. At Satkunneeah as much as two-"fifths of clean Cotton is picked."

---

* Elsewhere three-fourths, and seldom less than two-thirds.

This is attributed to excellence in the soil, not to peculiarity of the plant.

Two, often three, parties intervene between the cultivator and shipper: Beoparees go into the hills to purchase, either as principals or agents; they store the Cotton in golahs, from whence it is bought by merchants from Eastern Bengal.

"The price above given is the average paid by the Beoparees: "between them and the Joomeas other dealers sometimes intervene, and "of course intercept part of the profits: in re-selling, the Beoparees "make at least a rupee per man, but it is not in this only that their "profits consist; rude scales are used, and heavy weights, 50 or 60 seers "to the man.

"Besides the Cotton included in the above estimate, a good deal "is left for home consumption; perhaps the ordinary crop of the "district may be 79,000 mans, or 29,000 mans of clean Cotton."

He estimates at 2·04*d.* per lb. the price at which the cultivator could profitably sell his clean Cotton; in the Chittagong bazars it was at the same time selling for 6*d.* per lb.

In 1848 no change had taken place: the price of Cotton is stated to be 2·94*d.* per lb.: the area annually under the crop is variable from year to year, and the produce per acre uncertain. No Cotton was grown in the plain, and extension of the crop was thought improbable.

In this year Mr. Sconce tried at Chittagong some of the Mexican seed acclimated by Dr. Wight at Coimbatore. He found it succeed better than any of the exotic varieties, several of which he had previously experimentally cultivated. Although the season of his experiment was exceptionally unfavorable, he secured about 101 lbs. per acre of clean Cotton, and particularly noticed that insects, which in every previous trial of exotic Cotton had proved very detrimental, did not attack this variety at all.

CSL

The samples which he sent to the Agricultural Society were pronounced excellent by the Cotton Committee, and valued at 5¼*d.* to 5½*d.* per lb.

These were subsequently sent home, and in June 1851 examined by Messrs. J. Cook and Co., London brokers, who valued them at 5*d.* per lb. by the then market rates.

In 1857 the Collector gives a short description of Cotton cultivation in Chittagong, which does not apparently apply to the same method as that spoken of by his predecessor in 1848.

"The soil should be moist: paddy is sown in it: fertile land is neces-"sary: the land being well ploughed, no special weeds grow; no irriga-"tion is employed: the seed is well rubbed with moistened earth, and "placed in a hole three inches deep, and covered with earth: sowing "done in April and May: no labor is bestowed on weeding during growth: "Cotton picked in October and November: 138lbs. of ginned Cotton "yielded per acre: no manure is used: the plants are subject to no "diseases."

In 1861 special attention is drawn by the Commissioner to the Kupas Mehals, or "Cotton country," which lies along the east of Chittagong. The Commissioner thinks that traders could easily stimulate production and introduce new varieties of Cotton into these hills, which have long annually grown large quantities of the staple.

CHOTA NAGPORE.

Districts.
HAZAREBAUGH.
PALAMOW.
MAUNBHOOM.
SINGBHOOM.
SIROUJA.
SUMBULPORE.
(and others.)

As the boundaries are represented on the revenue survey maps of 1858, this division extends to the Rewah territory on the north-west, to the frontier of Nagpore on the south-west, and has an area equal to two-thirds of that of Bengal Proper.

CSL

This immense tract is altogether within the upland area, and is but thinly populated, by far the greater part of its surface being covered with forest and jungul: much of this is, however, of great natural fertility, and many square miles are described as well adapted to Cotton cultivation: great facilities, moreover, are stated to exist for obtaining land on easy conditions, and the great difficulty seems to be that the whole of the division is far from the sea, and being for the most part a wild, hilly, and uncultivated region, no roads, of course, exist.

In Palamow, however, water-carriage is said to be available during part of each year, and in that district good Cotton land is said to abound. Again, in the valley of the Mahanuddi, Cotton is now largely grown, and vast tracts are spoken of as there available for an extended cultivation: we know also that Cotton boats now navigate that river as far as Sonpoor, if not up to Sumbulpore itself.

The soils to be found within such a tract as Chota Nagpore must, of necessity, be very various in every way: there are, we know, great alluvial flats in the valley of the Mahanuddi and smaller ones elsewhere; and the different rocks have certainly impressed mechanical and chemical characters on the soils of the different valleys, and undulating plains, which will be found to offer a wide field for selection.

In 1837 Baboo Rajkissen Mookerjee tried at Hazarebaugh an experiment with three kinds of exotic Cotton; all his seed germinated, but the young plants of two out of the three varieties all died: what these kinds of cotton were, he does not mention: those of the third kind, namely, Egyptian, flourished, and grew vigorously: the crop succeeded so well that the Baboo conceived sanguine hopes that it might be largely introduced in the district. The samples he exhibited at a Meeting of the Agricultural Society* were greatly praised, and the Cotton Committee pronounced them to be equal to good Sea Island, and worth 16*d.* to 18*d.* per lb.

---

* Agricultural Transactions, Vol. VI., page 114.

CSL

In 1848 the Commissioner reported that the soil was not suited for the growth of Cotton, and that what was grown in his division, (not then as large a province as it has since become,) was short-stapled, and by no means good ; but that in Sumbulpore, Cotton of a very superior kind was said to be produced, and also that the method of cultivation there pursued was good.

His subordinate officers, however, state that in Hazarebaugh 4,080 bigas were under Cotton, and that there was abundance of land to which the crop might be extended : Cotton was sold at 4*d.* per lb.

In Lohardugga 20,000 bigas were in Cotton cultivation, and 30,000 more might be added : Cotton sold at 3½*d.* per lb.

In Maunbhoom 7,900 bigas were then under Cotton, which could be increased to 100,000 bigas, or even more : Cotton sold for 3*d.* per lb.

In the same year Colonel Ouseley tried Dr. Wight's Coimbatore Mexican seed : some was sown in the public garden at Hazarebaugh, some in his own : a " second-rate soil" was purposely selected, and the seed was sown late in July : no special care was taken of the plants, nor were they irrigated : they throve however, grew at least as large and strong as the native kinds, and yielded as abundantly : and they seemed in every way as well suited to the soil, climate, &c., as the Cotton of the country.

Samples were submitted to the Cotton Committee, which were thought favorably of, and valued at 5½*d.* per lb.

About the same time Mr. Robinson tried seed of the same kind at Ranchee : he chose a " light sandy" soil, and manured it well, but did not irrigate : the seed was sown late in the season, and it was at first supposed to have failed : this was, however, a false alarm, for, after drooping, the plants revived, and while still at an early stage of their growth, looked healthy and vigorous : the crop is said to have done fairly on the whole.

CSL

The samples submitted to the Cotton Committee were not considered quite as good as those sent by Colonel Ouseley, although fair: they were valued at 5*d.*[*]

In 1850 Colonel Ouseley again tried Mexican seed (from Coimbatore) at Hazarebaugh.

Samples of his crop were, in June 1851, submitted to Messrs. J. Cook and Co., London brokers, who pronounced them to be fair good, but rather uneven in length of staple, and worth 5*d.* per lb. at then prevailing rates.

In July 1851[†] Captain Haughton sent to the Agricultural Society specimens of a Cotton which he speaks of as either indigenous to Chota Nagpore, or else long acclimatized there: its seed, he says, is sown "on "rugged trap hills, where other cultivation is impossible, and where its "plants grow for three or more years," yielding largely, although quite uncared for.

The Cotton Committee were of opinion that the samples submitted to them were the produce of acclimatized Bourbon seeds; the fibre was strong, yet soft, and of good length; they believe that such Cotton would meet a ready sale, and command a high price in the European market.

In 1861 the Commissioner reports that a coarse description of Cotton is grown in small quantities, and for local consumption, in all the hilly parts of the division: this Cotton does not appear suited to the English market, so that it is needless to enquire into the practicability of its extension: "and attempts repeatedly made to grow a better "description of Cotton have always failed from the unkindliness of the "soil."

In Palamow and Toree a better description is grown, and to some extent exported: the soil of this tract is rich and well adapted for

---

[*] It is unfortunate that the absence of a more complete record of the conditions under which two such experiments were made, deprives us of the power of learning why the same seed, under conditions generally similar, gave different results.

[†] Agricultural Journal, Vol. VIII., page 42.

CSL

Cotton: a steady demand and cheap means of transport would improve the quality, and increase the quantity: all the Cotton exported is carried on pack-bullocks to Chattra, in Hazarebaugh, and thence on carts to Chumparun, on the grand trunk road. Chattra is the principal mart of the division, and the roads leading to it from Palamow, from Toree, and from Ranchee, although now mountainous and bad, could be made passable for carts without considerable outlay: the trade in Cotton (and other produce of the division) would be considerably stimulated by the conversion of the track between Chattra and Chumparun into a good cart road: and this could be cheaply effected, as the country is open and level.

Singbhoom is regarded as the district, in this division, which offers the most promising field for experiments in the cultivation of Cotton, which already grows well there, and where the people would readily extend the cultivation, if assured of a demand for the produce.

The foreign varieties which have been tried in Singbhoom have succeeded; 116 lbs. is estimated as the yield per biga*: this Cotton is never offered for sale. The common country Cotton sells for nearly 3*d.* per lb., but this is bazar price, and not that at which the growers sell it.

The part of Singbhoom, where the cultivation of Cotton might be at once commenced, lies within twelve days' journey of Raneegunge *viâ* Poorulia; during the season when Cotton is ready for export, carts can travel the whole way: that part of it which lies between Raneegunge and Poorulia (62 miles) is annually put into good order as a fair-weather road: the remaining portion, from Poorulia to Chybassa (61 miles) is just kept open in the dry weather.

In Palamow the jungul is cut and burned, the ground ploughed to mix the ashes with the soil, and the seed then sowed broad-cast; the worst soil is selected for this kind of crop, as "good land is required for more valuable ones, and Cotton thrives well any where:" the Cotton thus grown is considered inferior: the scantiness of the population is a difficulty: there are extensive tracts of land well watered, and apparently very fertile, which only require labor to be productive: the district officer, however, thinks that people could be easily attracted, were any settler to attempt systematic cultivation; there are no cart roads, and it would be very costly to construct such on account of the hilly nature of the country, and the numbers of rivers: the Koel River, a tributary of the Soane, is navigable for small vessels during the rains.

---

* It is not stated if this be seed or clean Cotton, or what biga is meant.

Assam Division.

Districts.
GOWALPARAH.
KAMROOP.
DURRUNG.
NOWGONG.
LUCKIMPORE.
SEEBSAGUR.
MUTTOCK.

The valley of the Bramaputra forms this division, from where the river enters the great alluvial plain, as far to the east as the British Territory extends.

It is a fine and fertile tract: the lower spurs of the great Himalaya form the northern side of the valley, and the low hilly country of the Garrows, Khasis, &c., lie on the south: the surface of the immense plain through which the river winds, is said to be varied by irregular groups of rocky and wooded hills: the soils of the valley must be of many different kinds, and offer endless variety to the agriculturist: of their chemical properties we know nothing, but physically we hear of rich loamy soils, stiff tenacious clays and every gradation of admixture of these with sand, &c., until the light red gravelly soils of the hill sides pass into the rock itself.

Mr. Price says that certain lands in Muttock, and in the neighborhood of Saikwah, are "well suited to the cultivation of Cotton, being "much superior to any that I have previously seen in India for that purpose: the soil in both places being composed, in a great measure, of a "rich decomposed vegetable substance, with a fair proportion of coarse "granite sand in it." He farther says that "the indigenous kind of "Cotton called *Dhera* is a very superior kind of native Cotton, easily

CSL

"cultivated, gives a fair sized boll, and yields a larger proportion of wool "when cleaned, than any other kind of native Cotton I have yet seen: it "is of a softer and more silky nature than usual with native Cotton."

On the Dikho River he found a soil "too stiff for Cotton;" on the Dunseeree River he found a variety of soil, "some of which is well suited to the growth of Cotton;" of Tezpore he says that he has never seen finer alluvial lands; of the Durrung district generally, he says, "the land is "much better suited for Cotton than any that I have previously examined "in India;" he thought "the sandy alluvial soil" of Saikwah better for the indigenous *Dhera* Cotton, and the "rich soils of Muttock" better adapted to the exotic.

In 1832 Captain A. Bogle stated that the reason why Cotton was not grown in Rungpore was, that the villagers there could not afford to grow it as cheaply as the Garrow hill-men could sell it at Gowalparah, and suggested that perhaps these latter might be able to cultivate a better kind of Cotton on the grounds where they now profitably grow the inferior article. He applied to the Agricultural Society for exotic seeds to try the experiment with*: he stated that to these hill people the Cotton crop was all-important, being their great staple†; as in exchange for it they obtain every thing not produced in their hills, which they may require: if, then, they could obtain a kind of Cotton which would sell at a higher price than what they now raise, and which, at the same time, did not necessitate any very extraordinary changes in their methods of cultivation, it would be a great boon to them, and the Cotton, which should satisfy such conditions, would certainly spread among them.

Captain Bogle, along with this application, sent samples of the Garrow Cotton: this the Cotton Committee pronounced to be a bad specimen of the commonest Bengal bazar Cotton: having, save strength alone, no one good quality.

---

* Agricultural Transactions, Vol. II., page 112.

† The Collector of Chittagong made a similar statement as regards the Joomeas.

CSL

In 1836 Major Jenkins tried Egyptian seed at Gowhatti : he said that the climate was more humid than the average of Bengal, and certainly more equable ; he had great hopes of the crop, as the plants came up well, and grew vigorously : not one pod, however, ripened.

In 1842 Dr. Scott tried Nankeen Cotton at Gowhatti : the seed he used had been obtained from China, and it seems to have grown well and yielded a crop.

The samples submitted to the Cotton Committee were pronounced to be in no way superior to the common Cotton of Bengal, and valued at 2½*d*. per lb.

In 1845 Mr. Welby Jackson, Commissioner of Rungpore, when inspecting the experimental cultivation carried on there by Mr. Terry, the American planter, found that no Cotton could be profitably cultivated in that rich district, on account of the low price at which the Garrows could grow the crops on the hills at the other side of the Bramaputra. He recorded his opinion to this effect, and urged (exactly as Captain Bogle did in 1832) that an attempt should be made to introduce a better kind of Cotton among the hill-men.

In 1848 Major Jenkins sent to the Agricultural Society samples of two kinds of Assam Cotton : one was from the Muttock district, of a variety grown in the plains : it is, in Assam, considered superior in quality to the other, which is that cultivated by the Nagas, Garrows, &c., along the hills, and which goes by the name of Gowalparah Cotton. Major Jenkins affirms that there is in Assam a practically unlimited area of such land as can grow such Cotton.

These samples were declared by the Cotton Committee to be no better than common Bengal Cotton, and valued at 2*d*. per lb.

In 1848 the Commissioner (sending replies to the six questions) reports that the annual crop of the division is estimated at 100,000 mans, which is principally the produce of the hills : that in Gowalparah, Nowgong, and Luckimpore, there is a vast extent of land well suited to the crop. That

CSL

"any circumstances which should cause a very trifling rise in the price "of the wool would be attended with a great increase in the cultivation "of the plant." The lands of Muttock are high and well drained, and the climate cool and wet, and "he is persuaded that good Cotton could "be grown there from the superior indigenous, or from acclimatized "American seed."

The average of the figures representing the price of cleaned and uncleaned Cotton in the different districts of Assam in 1848, gave for seed Cotton 1·07*d.* per lb., and for clean 2·74*d.* per lb., which, considering the circumstances of the country, and that it is a great exporter of Cotton, are certainly very high. The same remark applies to Chittagong, where, however, the revenue officers state that their estimates are based on trade returns, and that the cultivator can probably sell his raw produce at a much lower rate than would be suggested by the prices stated.

In 1849 Mr. H. Mornay* tried an American variety called "*protective*" in Upper Assam: he had obtained the seed from the Society.

The Cotton Committee, to whom samples were submitted in 1850, considered the Cotton of good staple and good color: it very closely resembled Upland Georgia Cotton, and was worth 5¼*d.* per lb.

These samples were sent home, and examined by Messrs. J. Cook and Co., London brokers; the Cotton was declared to be clean, good color, and fair staple; "would answer the purpose of middling bowed Georgia": worth 5¼*d.* per lb.†

In 1850 Major Jenkins recommended Muttock for Mr. Price's experiment: he stated that trials on a small scale hitherto made there with exotic Cotton seed "had been attended with very successful results, as to their main object, namely, the quality of the wool." He believes that "in no part of India could an experiment be made at less cost, and with a fairer prospect of success."

---

* Agricultural Journal, Vol. VII., page 210.

† I bid, Vol. VIII., page 22.

We have already seen what Mr. Price thought of the soil, &c.; in the second part of this volume will be found the narrative of his proceedings.

In 1854* Colonel Hannay, of Luckimpore, received half a man of *Sea Island* Cotton seed from Government: scarcely any of this germinated, and only a few plants bore ripe pods; half a man of *Petti Gulf* seed, received at the same time, entirely failed, and not one seed germinated: some *Seychelles* seed did germinate, and indeed grew well, and became healthy, vigorous plants, but no flower or pod ever appeared on any of them during two years, and the bushes ultimately died out: he continued cultivating the Sea Island Cotton from the seed yielded by the plants which came to maturity: it was, however, a difficult crop to raise, was easily affected by damp and wet weather, which encouraged insects about the pods.

Petti Gulf was again tried: its plant is much more hardy than the *Sea Island*, and if its produce be suited to the requirements of the English market, it might be cultivated in Upper Assam: all rice lands being apparently adapted to it.

In 1856 samples of Cotton produced by plants of the above kinds were submitted to the Society's Cotton Committee.

The *Sea Island* Cotton was pronounced to be "a particularly good "Cotton, in every way suitable to the English market: resembles in "some respects the best kinds of Egyptian, good color, long and soft, "and fine silky staple, but not as strong as some Sea Island Cotton": value 15*d.* to 18*d.* per lb.

One member dissented: thought the sample showed considerable and decided degeneracy from the good Sea Island Cotton it represented; and on account of its *inequality* in length and strength, considered it to be worth only 11*d.* to 12*d.* per lb.

The *Petti Gulf* Cotton was rather short and weak in staple, but of

---

* Agricultural Journal, Vol. IX., page 386.

CSL

good color and clean, is suited to the English market, and worth $4\frac{3}{4}$*d.* to $5\frac{1}{2}$*d.* per lb.*

In 1857 the Commissioner states, that with the exception of the Luckimpore district, no Cotton is grown in the valley of Assam: all that appears in its various marts being the produce of the hills: the Luckimpore Cotton is superior to all kinds of hill-grown Cotton: he considers Colonel Hannay's experimental cultivation to prove that the soil, climate, &c., of Luckimpore, are well suited to certain exotic varieties of Cotton: but believes that the natives would never bestow the care necessary for its successful cultivation, and that European settlers will continue to find tea-planting a more remunerative speculation.

The Cotton of Luckimpore is chiefly grown in the southern part of the District, that is, in Muttock (which lies south of the Bramaputra): two varieties are cultivated, the *Dhannah*, sowed broad-cast in March or even earlier, and the *Dera*, sown in July, on ground off which grain has been reaped: both kinds are picked in December, the former sometimes a little earlier: the land selected is always dry, beyond inundation, and a "loose fertile soil" is considered the best: granitic sand is stated to be mixed with these soils, and some are ferruginous; stiff clays occasionally occur: the undulating grounds in the north-east of Muttock, well raised above the river, are considered the best for the native Cotton, the soil of these lands being like that already described. The higher ridges of the ground in the Saikwah sub-division also grow a superior kind of Cotton. When rain falls heavily in October or later, it greatly damages the Cotton crop, which is then coming into bearing: no irrigation is ever needed: the crop is weeded, but little care is bestowed on the cultivation: no manure is used: the Cotton is not subject to any disease, but is a hardy plant, and not attacked by insects.

In Gowalparah the soil used is a dry one, not considered the most fertile: boota,† chillies, ginger, and yams are all sowed along with the

---

* All these values are based on the Liverpool rates of July 1856.

† Indian corn.

CSL

Cotton, on the well drained slopes of the hills: no irrigation is used: the seed, sowed in May and June broad-cast, has no subsequent care bestowed on it, and the Cotton is picked in December: much drought injures the plant, which, when young, is liable to be damaged by insects.

In Nowgong, Cotton is, to a small extent, cultivated in betel nut gardens and other such places: there the soil is rich and moist; on the large scale it is grown here, as elsewhere in Assam, on the slopes of the hills. In Durrung, Cotton is grown on light, sandy, porous soil, lying along the lower slopes of the Bhootan hills: a variety of other crops are all grown with the Cotton in the same ground, whose fertility is said to be exhausted in a single season: no manure is used, but a new place taken each succeeding year.

It will be remarked that all the accounts of this kind of jungul cultivation in Assam show that the same system is followed there as in similarly situated localities elsewhere, the only difference being that in some places the jungul is burned previous to the sowing of the seed, and in others not; and that sometimes a second or third crop is obtained in succession from the same field, while at others the place is abandoned after one only. For the whole of Assam the estimate of out-turn per acre is rather indefinite both in the returns of 1848 and those of 1857; it always, however, ranges far above the average of 100 lbs., which so many of those best informed on the subject have followed Dr. F. Royle in assuming as a basis of calculation: from all the figures recorded, an average of 160 lbs. is obtained: one only statement is excluded from the calculation, namely, that asserting that 10 mans of ginned Cotton per acre has been obtained, which is presumed to be the result of some clerical or typographical error.

In 1861 the Commissioner attributes to the want of roads, the fact that Cotton cultivation has not been much more widely cultivated than it is.

CSL

DARJEELING.

The Darjeeling Morung is described by Dr. Campbell as a part of the Terai lying between the Teesta and Mechi Rivers; it is 45 miles from east to west, with an average width of 15 miles from north to south. It is sub-divided into the Upper and the Lower Morung: of these the former alone grows Cotton, and is about 8 miles wide: it is covered, for the most part, with jungul, and inhabited by the Mechis and Dhimal tribes: the Lower Morung, although more generally fertile, is not suited to the growth of Cotton. The ground of the Upper Morung has a gentle slope towards the south; the soil is "a light blackish loam, occasionally mixed with gravel;" when a patch is selected for Cotton cultivation, the forest is cut in the cold weather, and burned towards the end of it: the ashes are spread over the surface, and in March and April the ground is finally "prepared with some care." The seed is sown in May and June, and picking commences in November: a crop of rice follows next season on the same ground, after which it is allowed to lie fallow for five years, by which time it is once more well covered with jungul, and ready for a repetition of the process: manure is never used, nor is irrigation needed, and the crop is generally considered a sure one. The only misfortunes to which the crop is liable are great drought in May, and very heavy rain in October: the latter is a very rare calamity, and Dr. Campbell, in eleven years, knew of but one May during which plentiful showers had not fallen; during the same time rain had three times fallen in October, to the possible injury of the Cotton crop: he had not, however, heard it stated to have been so.

The best cultivators sow the seed in holes, but it is often sown broadcast along with rice: the quality of the Cotton produced is said not to be affected by the latter method of cultivation, but it is said to be always poor when weeding is neglected; and the crop ought to be weeded three or four times during growth: the average yield is stated to be 108 lbs. per acre, and the price 3¾*d.* per lb.

Labor is not abundant, but it is cheap, and could easily be attracted.

The centre of the Cotton-growing district is about 35 miles from Darjeeling, to which there is a good road, and about 10 miles from Kursiong, which stands 4,000 feet above the sea, and is a healthy climate for Europeans.

During July, August, and September, water-carriage is available from Tytalyah, which is close to the Terai, and during the rest of the year from 50 miles lower down the river.

Considerable quantities of Cotton are grown in the Nipal Morung to the west, and in the Bhootan Doars to the eastward, as also in the valleys of Sikim, and in those of the Darjeeling hill territory: the quality of all this Cotton is said to be identical with that cultivated in the Morung, but the pod of the hill Cotton is smaller. The Cotton Committee of the Agricultural Society,* to whom samples were submitted, pronounced this Cotton to be short, harsh, and curly in staple, but of tough, strong fibre: the wool adhering tenaciously to the seed: it was valued at 4¾*d.* to 5*d.* per lb. at the market rates of 1850, but was stated to be worth only 3*d.* to 3¼*d.* in ordinary times.

In 1861 Dr. Campbell again furnished a report on the territory under his charge: he states that Cotton is grown for exportation in the valleys of the Nipal, Sikim, Bhootan, and Darjeeling Hills, in the Morung, and Terai of the Nipal and Darjeeling Territories, and in the Bhootan Doars. The quantity cannot be exactly stated, but it is estimated that one-fourth of the crop is kept for local use.

The quantity raised in the Darjeeling Terai, in 1859-60, is stated to have been 172,200 lbs. of seed Cotton: these figures are said by Dr. Campbell to be under, rather than over, the quantity they are stated to represent: of this at least three-fourths are exported uncleaned, principally to Kissengunge and Ranigunge in Purneah, and to Hurripore

---

* Agricultural Journal, Vol. VII., pages 287 to 292.

CSL

and Raigunge in Dinagepore. In those places the Cotton is cleaned, spun, and woven into a coarse cloth, which is re-exported, and finds its way back to the Terai and the hills.

The Raigunge cloth is of excellent quality, and is highly esteemed by the natives: it is considered more durable than the Manchester and Glasgow "unbleached sheeting," which it competes with in the bazars.

The price of all this Cotton is said to average Rupees 3 per man for the raw produce, and the cleaned Cotton, at the above-mentioned marts, to sell for 6*d.* per lb. The price of Cotton in Calcutta, at that time, was 5*d.*, and that of "middling New Orleans," in Liverpool, 6½*d.* to 7*d.* per lb. The Morung and Hill Cotton could not command that price, so that "it would be of no avail to watch the rise and fall of the English "market, or to spend money in improving the means of transport to "the sea, so long as Cotton, which is worth 6*d.* per lb. in Dinagepore, "does not realize more at Liverpool, and it is hopeless to look for Cotton "for England in this part of the country, until the prices at home rise "considerably, or the quantity produced here is in excess of the local "demand." Dr. Campbell states, that in 1852 he made a very successful experiment with American seed, and he suggests, that, as a means of improving the general Cotton crop of the district, annual distributions of seed should be made: he also recommends heavier Cotton fabrics being introduced to replace the local manufactures, and a few roads and rough bridges might, he thinks, by facilitating egress, increase the out-turn.

I have no means of ascertaining whether the prices of Cotton throughout the Bengal bazars averaged about 6*d.* per lb. in 1861, but in 1848 the northern marts of Purneah and Dinagepore presented no exception to ordinary rates, and the price of Cotton there was not in excess of the general average: if this remains so, as is probable, the question of the supply of Cotton for the English market, obtainable in the Morung, turns on the same general considerations as affect it when considered in reference to Bengal generally.

ARRACAN DIVISION.

Districts.
AKYAB.
RAMREE.
SANDOWAY.

The Arracan division lies along the shore of the Bay of Bengal, southward from Chittagong, and is bounded on the east by a range of hills, which, although 80 miles from the coast in its northern portion, gradually approach nearer and nearer the sea, until they form the southern point of the Peninsula at Cape Negrais: the fiscal boundary of the division not extending quite so far in this direction.

The coast is described as low and sandy towards the north, farther on as a network of creeks, rivers, and islands, and on the south as bold and rocky.

Inland great diversity exists: swamps and marshy plains, intersected by many streams, are succeeded by fertile alluvial flats; and gently undulating slopes pass upwards into the hilly ground to the east.

The first mention I have found made of Arracan as a Cotton-growing country is in the returns of 1848.

In the reports then made, the revenue officers did not take into account the Cotton grown in the hills: speaking only of the plain country, they state that the cultivation is very small indeed, and not likely to be increased: Aeng and Ramree together are stated to have only about 150 acres under the crop. Sandoway, however, had 380 acres, and the officer in charge thought that this might be extended to 1,900 acres were there a demand for the produce: he states that the Cotton is of great fineness, white, and strong in staple, though somewhat short: that grown in the plains far exceeds in fineness and length of staple the produce of the hills: Cotton is sold in seed only; cleaned, it is stated to cost at

CSL

Aeng 6·85*d.* per lb. : the estimated yield per acre is not given with exactness.*

In 1857 the Commissioner reports that in Akyab very little Cotton is grown : the cultivation is confined to the hills, where the quantity raised is small, and the quality bad.

In Ramree the extent of the cultivation is also stated to be small : it is carried on on freshly cleared ground, near the base of the hills : the seed is sowed along with Indian corn and sesamum, never watered or weeded, and left to nature from the time it has attained a height of four or five inches ; it is sown in November and picked in February ; no manure is used, and the same ground is seldom used a second time.

In Sandoway the soil used is stated to be rich, and retentive of moisture : the seed is sown after the rains, on sloping ground : it is never irrigated : the ground is prepared by ploughing : the seed is soaked for a night previous to sowing : it is scattered broad-cast : October is the sowing month, and picking begins in March : no manure is used, but the stalks are allowed to decay on the ground : the plant is not subject to be destroyed by insects.

It appears from the statement that the stalks are allowed to decay as manure, that this is not a case of jungul cultivation, abandoned after one crop is taken off the ground, like that described in Ramree. This is the first instance we have met with of sowing taking place systematically after the rains, on grounds not flooded : farther north there seems to be always an intention of some at least of the rains being of use in bringing on the young plants.

In 1861 the Commissioner states that the quantity of Cotton grown in the division is small : that it is principally raised by the hill men : that the kind of Cotton is similar to that cultivated by the hill tribes all round the eastern frontier of Bengal : that the staple is short, hard, and

---

* For Ramree the yield is 180 to 200 mans per *doon* ; at Sandoway 48 mans per *doon* : the doon equals 6¼ acres : so that Sandoway yields 614 lbs. per acre, which is, of course, seed Cotton : but 2,560 lbs. cannot be so explained for Ramree : there is evidently some error.

CSL

strong, but that owing to the small quantities of it grown, it commands a high price in Arracan. Experiments are stated to have been made on the cultivation of exotic Cotton in Ramree; but they are represented to have failed almost always.*

Mr. Roghé tried in Arracan an experiment with Sea Island Cotton: in January 1860 he sowed this seed in a plot of sandy soil, half a mile from the beach, having previously manured it with horse dung: he believes that it would have been better to have sown two months previously. When his plants were about four inches high he transplanted most of them: all those he had removed were unfortunately destroyed by some goats who got into the enclosure: those which had remained in their original locality, throve, and yielded well: he sent samples which he regretted had been allowed to get stained by rain.

These samples were examined by the Agricultural Society's Cotton Committee.†

The Cotton was pronounced to be "one of the best that has been "submitted to the Committee, as the produce of foreign seed: it is a "most valuable long-stapled Cotton, slightly stained in color, still it "would fetch about 2*s.* per lb.: this quality is chiefly used for spinning "fine thread adapted for the English market."

In March 1861 Mr. J. P. Langlois suggested that "*gossypium religiosum* would be well suited to the slopes of the Akyab Hills," and might be there successfully cultivated on a great scale: he points out the valley of the Naaf River, in the north of Arracan, as a favorable locality for an experiment.

Major Verner and Captain Faithfull have both reported favorably on Mr. Langlois' proposition: both agree with him that the Naaf Valley would be an admirable place for an experiment on an extensive scale: waste lands, supposed to be well suited for the cultivation of the plant, abound there, as well as large tracts of land now cultivated, on some of which Cotton is actually grown: the plant is, moreover, stated to be indigenous in the wild state: labor, too, is less scarce here than elsewhere in Arracan, and the district abuts on the Chittagong country, which is more thickly populated, and whence a supply of laborers might be obtained.

---

* I have failed to discover any record of these trials.

† Agricultural Journal: Proceedings, 13th June 1860.

PEGU.

Districts.
RANGOON.
BASSEIN.
PROME.
HENZADA.
TOUNGOO.
THARAWADDI.

It is only politically that the valley of the Irrawaddy, of the lower part of which Pegu or British Birmah consists, is connected with that of the Ganges. Although geographically quite distinct, there are indeed physically many points of resemblance between the two Provinces: there is for instance a great delta in each case; higher grounds beyond, still alluvial; low hills bounding the valley; and higher hills behind these. The British Territory forms the lower part of the valley, and is described as a fine, rich, and flat country, intersected by many streams, in some places covered with jungul, but in others well cultivated and very fertile. Much of it is said to be suited to the growth of Cotton: but it is farther up, on the higher alluvial tracts, and on the lower slopes of the hills, that the most promising localities are said to lie. Abundance of moisture and equability of temperature seem to be the main characteristics of the climâte.

Until lately no instructive experiments seem to have been made on the possibility of introducing foreign varieties of Cotton, and as to the opinions expressed on the general aptitude of Pegu, for the purpose, most of them are certainly favorable.

In 1831 Major Burney, Governor-General's Agent at Ava, gave in one of his despatches an interesting account of the Cotton trade of Birmah.

MINISTRY OF CULTURE · GOVERNMENT OF INDIA
GSL

He describes the cultivation as extensively carried on throughout the kingdom: especially between the capital and the sea, in the valley of the Irrawaddi: the produce was exported in two directions, namely, northwards, into the Chinese Province of Yunan, and southwards, to Bassein, for shipment, as was supposed, for Dacca: a large quantity was also believed to be sent to the same place over the passes in the western hills, by way of Arracan and Chittagong.*

Major Burney consulted Messrs. Laird and Gouger, British merchants, then resident at Ava, on the statistics of the trade: they believed that 21,000,000 lbs. of Birmese Cotton was annually sent into China, and 7,200,000 lbs. to Dacca.

Mr. Lane, also an Ava merchant, obtained for him some returns of the Birmese Custom House, which showed that in the year 1830 duty had been levied on 37,080,000 lbs. of Cotton for export. Although these estimates seem to confirm each other, Major Burney considers both to be greatly exaggerated: he thinks that the Custom House officer at least added a cypher to his figures. He gives many reasons for this, and from various sources obtained information, which led him to think that the annual average quantity of Birmese Cotton exported was :—

To China	3,708,000	
,, Bengal (by both routes)	3,608,000	
		7,316,000 lbs.

By far the larger portion of which was grown in the valley between Ava and Prome.

The sowing season is the same for Cotton and for Rice, namely, April and May: the seed is sown broad-cast in well tilled land, sometimes along with vegetable seeds, but never along with rice: the

---

* Mr. G. Lamb, however, states, on the authority of the Customs records of Dacca, that up to 1831 no Birmese Cotton had ever found its way to that market: so that if, as he doubts to be the case, any Cotton be exported from the valley of the Irrawaddi towards Bengal, it must be all absorbed in the Chittagong and Luckimpore Districts.

Cotton is picked in October and November, and a scanty second crop is often secured in the following March, before the plants are cut down.

Nankeen, or red Cotton grows along with the white kind, and the Birmese affirm, that when sowing the seed they can't tell of what color the produce will be : no care has ever been taken to keep the seeds of each kind separate, and they are undistinguishable in appearance. No manure is ever used, and the cultivation is slovenly and wasteful : but one-third of the gross weight of the raw produce equals that of the cleaned Cotton.

For separating the seed from the fibre, besides the common churka, like that in use in Hindustan, the Birmese employ a larger machine, with iron rollers : they also use the bow : by means of these a laborer can turn out 36 lbs. of clean Cotton per day, and is paid 3½ annas as wages.* The ordinary bazar prices of clean Cotton range from Rs. 10 to Rs. 14 per man,† that is 3*d.* to 4·2*d.* per lb.

If the Nankeen or red Cotton be offered for sale, something additional is charged; this is, however, only to cover the cost of separating it from the mass of the crop.

Major Burney states that the Cotton of the Martaban Province, known as Tenasserim Cotton, has a much longer staple than that at Ava; that some which he saw at Bankok, stated to be brought from the frontiers of Tavoy, was also of a superior kind : that the Karens who there grow Cotton are believed to cultivate carefully, and that throughout the country the oil obtained from the Cotton seed is largely used.

Major Burney had seen some bushes of a perennial variety of Cotton, which he was informed grew when mature, to the size of a tree into which a man might climb : it was considered an exotic in the

---

* Both the out-turn and the pay are greatly in excess of the highest recorded for any part of Hindustan.

† The Calcutta bazar rate is stated to have been at that time about Rs. 12 per man, 3·6*d.* per lb.

CSL

country, and he suggests that it may be of the Brazilian or Pernambuco kind: the plants which he saw were grown in a garden, and only as a curiosity, but they yielded very largely, the fibre was of great length, and easily separable from the seed; he was told that near Taroup Myo such Cotton was cultivated regularly: the Birmese did not admire it, and would only employ it for making lamp wicks.

Major Burney sent samples of this Cotton and of its seed: which were submitted to the Agricultural Society by the Secretary to Government, and reported on.*

The Cotton was pronounced to be the produce of Pernambuco seed: the fibre was long, fine, and good, well suited to the wants of English spinners; it was easily freed from its seed, and had probably been of good strength and color, but the specimen had been greatly injured by damp, &c., in transit. Such Cotton wool would, if clean, and in its natural state, sell in Liverpool for 7½*d.* to 8½*d.* per lb., at the rates of 1831.

In May 1854 Mr. Price had inspected some of the Cotton-growing country of British Birmah: he reported that the lower part of the Delta of the Irrawaddi was not suited to the growth of Cotton, and specially ill adapted to any exotic varieties.

The climate of Prome being drier than that of the country nearer the sea, he thought favorably of: and the grounds lying along both banks of the Irrawaddi, from Prome up to Thyet Mew, he thought "superb Cotton land," and "the finest he had ever seen." A similar soil extends into the interior as far as he had been able to penetrate, and he was informed that such ground occupies an immense area in both directions from the river banks: he found proofs of a formerly great extension of Cotton cultivation, in the fact that patches of Cotton, now self-sown, are found in many places throughout the junguls: all this soil will, he is confident, suit exotic Cotton, and he thinks that the climate is likely to prove favorable also: the rain is, he hears, spread over a greater number of months than is the case in Bengal, which would be a great advantage in Cotton growing. The Sarrawak district he thought too low and moist.

---

* Agricultural Transactions, Vol. II., page 105.

He speaks of the agricultural methods as very rude: neither plough, hoe, nor spade is used: the villagers "merely ruffle the surface of the soil with a coarsely made chisel fastened to a piece of wood."

In the southern part of the country Cotton is sown on chur lands, after the inundation has receded.

He thought that the lands now growing the indigenous Cotton, on this system, would not be suited to any kind of exotic Cotton: in part of this district, however, just above the level of the inundations, a few miles from a place called Myadoung, he observed a tract of country, which he describes as well suited for Cotton cultivation; it consists of "rich plots surrounded by gravelly hills": finally Mr. Price states that the Cotton indigenous to Prome is, with one only exception, the best Indian Cotton he had seen.

In 1855 Colonel Phayre sent to Government a memorandum on the indigenous Cotton of Pegu. He states that most of the Cotton produced in the Province is grown on the hills which form the watershed of the country lying between the Irrawaddi River and the Sitang: a considerable quantity is also produced on the eastern slopes of the Arracan range: the elevation at which it is planted varies from 400 to 1,000 feet above the sea level: the soil is prepared during the months of January and February by the forest trees being cut down and left to dry in the sun, until about the beginning of May, or just before the first showers of rain, when the fallen and dried timber is fired. The seed is then sown among the ashes, a hole to receive it being scraped in the soil with a small hand hoe. Rice and Cotton are in some parts of the country very generally sown together: the rice ripens and is reaped in October and November: the Cotton commences

CSL

to be picked towards the end of February: the plant is an annual, and from the rude system of cultivation existing among the people, and the want of terraces, it is found necessary, on the hill sides, to make a fresh clearing of the forest for the crop each year. The Karens, Khyens, and Birmese cultivate in this way.

The cultivators sell the Cotton in seed: they have a churka like that used in India, to clean what they require for their own use: 30 to 35 per cent. is the proportion of clean to seed Cotton.

The price of this Cotton was very high in 1855, nearly 1½*d.* per lb. for the seed Cotton: three years previously it had been about one-third of that price—the increase being due to the late disturbances.

Up to 1852 the Cotton grown in the Prome and Meaday districts was purchased by Chinese merchants who had establishments on the banks of the Irrawaddi for cleaning it. They use iron* gins, and convey the cleaned Cotton to Ava by water, and from thence, by way of Bhamo, into the Chinese Province of Yunan. In March 1855 the Chinese merchants of Ava paid Rupees 55 for 365 lbs. of Cotton, and the quantity exported at this rate amounted to £80,000 worth. It had still to be conveyed 200 miles by water from Ava to Bhamo, and then carried several days' journey on the back of mules, before reaching its destination. The rate of exchange on Chinese Silver at Ava made the price of Cotton, as above given, equivalent to 3·75*d.* per lb.

In his Administration Report for 1856-57, the Commissioner of Pegu states that the average price of clean Cotton in the principal bazars of the province is stated to be 3*d.* per lb.; that although quite unfit for the European market, it meets a ready sale for export to China.

Pernambuco and Bourbon Cotton had, during the year, been experimentally cultivated with a partial success, and seed had been again distributed of the above, as well as of the Seychelles and Egyptian varieties.

---

* It is elsewhere stated that these are not saw gins, but made like the churka, with rollers only of iron instead of wood.

CSL

In the Report for 1857-58, the same officer states that the seeds distributed had, for the most part, germinated, but that they had been so carelessly treated by the Birmese cultivators, that no reliable conclusions could be drawn from the results of the experiment as to the Cotton-growing capabilities of the district.

From the Administration Report for 1858-59 we learn, that before the province had become a British possession, Cotton had been largely grown, and under certain protective restrictions, profitably; but that since then two causes had combined to discourage the cultivation: first, English spun yarn, now extensively imported, has decreased the price and diminished the demand for Birmese Cotton, and at the same time other crops have become more profitable than they had been before.

With regard to foreign Cotton, the above causes having established a prejudice against the Cotton crop, the Birmese naturally feels a disinclination to try seed which he is told will require great care in the cultivation, and whose success is at best uncertain, for the sake of securing a kind of produce which is notoriously out of favor.

In the Henzada district Egyptian, Upland Georgia, and Brazilian Cotton seed was distributed in 1858, but not more than one-fourth of it germinated, and the soil there appears generally unsuited to those varieties.

In the Tharawaddi district a similar distribution of seeds was made and with better success; Mr. Lloyd states, that from the general appearance of the Upland Georgia plants, he is inclined to think favorably of the experiment, and expresses his belief that, under skilful management, this Cotton would succeed: the natives, here, as elsewhere, are not anxious to give it a trial—for the reasons above given.

In August 1859 Dr. D. Brandis gives an account of the experimental cultivation: it had commenced in August 1857: some ground was cleared for the purpose near the Government timber depôt at Rangoon, and sown with Egyptian seed: the locality proved unfavorable, and the crop yielded was at the rate of 60 lbs. per acre, and not considered satisfactory.

In June 1859 25 acres of ground, which had been previously prepared, were sown with seed which did not germinate; it was bad seed: six acres were, however, sown with the Egyptian seed obtained from the previous crop.*

Dr. Brandis adds some information on the subject of the native Cotton: its price in the bazars on the Irrawaddi (clean Cotton) ranges from 2⅕*d.* to 3⅓*d.*, and up to 4⅗*d.* per lb.: he states on the authority of Mr. J. F. Watson, that when it can be purchased for 3⅓*d.* per lb., it may generally be advantageously exported to Europe, provided that it be of quality equal to Surat Cotton, and that freight does not exceed 1*d.* per lb.

Although little is exported, Cotton is of vast importance in the internal trade of the Province.

A large portion of the inhabitants of the hills do not produce enough rice for their consumption: and Cotton forms by far the most generally used article of barter in such cases: unless the price of Cotton rises at the same time, and in the same proportion, any increase in the price of rice would force all these hill people to extend their Cotton cultivation, and may in this way cause larger quantities to become available for exportation: again, the fact that English yarn is superseding that spun in the country, must lead to one of the three following results: it must either cause a decrease in the amount of Cotton grown,† or a larger amount of Cotton goods must be consumed, or else a greater quantity of Cotton must be exported. "Hence it may not be "unreasonable to view a future export of raw Cotton from British "Birmah as not altogether impossible."

---

* Dr. Brandis gives the details of the cost of clearing and preparing the ground, fencing, making a road, &c., which it is not necessary to reproduce here.

† It is stated by Colonel Phayre to have had this effect.

CSL

With regard to the introduction of exotic varieties of Cotton, Dr. Brandis advances the following considerations:—The Cotton grown in Birmah is a small shrub, its produce is short-stapled, but fine: with regard to the cultivation in the plains, he says that "on Toungyas the seed is thrown out after the paddy has been sown;" it flowers about the time when the rice is reaped, and is gathered in February and March: a small quantity is obtained the second year, but rarely the third; the plant lives, but being small, is cholked with weeds: the cultivators would consider it a great advantage to have a plant from which they could get a crop the second season: Upland Georgia might answer in this respect, and, if so, would be readily cultivated.

As to the hills, there are extensive tracts between the Sitang and Salween Rivers, where the people would gladly grow Cotton, but they find that the plant cultivated in the low country will not answer: it is supposed, and Dr. Brandis thinks rightly, not to flourish at a greater elevation than 1,200 feet above the sea in this latitude: American Upland seed was found to thrive well at an elevation of between 2,000 and 3,000 feet: should it be found to do so upon farther trial, it will afford an opportunity for extensive cultivation, as there are vast tracts of fertile mountain land available, "not only between Toungoo and the "Karen country, which is comparatively well populated, but also on "the whole of the mountains to the south, comprising the plateau of the "Upper Younzaleen and Salween: a country once densely populated, "now in a great measure deserted, but which, under the influence of "peace, and wise administration, will undoubtedly soon revert to its "former flourishing state."

As to the cultivation on the river banks, the grass is cut before the floods; when these retire, it is cleared off, and the seed sown, about September: the Cotton ripens in March and April: and it is possible that in such places some superior kind of Cotton may be found to grow.

At present prices rice is a more remunerative crop than Cotton, on any ground where both can be grown.

All hopes of introducing exotic Cotton must rest on a steady demand for exportation, as in the country itself it will not command a better price than the worst indigenous kind: the fate of exotic Cotton runs the risk of being the same as in Coimbatore, where its cultivation "has decreased, because it requires somewhat more labor and expense "(than the native kind), but has no steady demand, being suited for "the European, but not for the native market."

The whole of British Birmah has very great advantages in the important particular of water-carriage.

Cotton exported from British Birmah, 1853—59.

YEARS.	Value of quantity exported.	PRICE OF COTTON.		Price of imported Yarn.
		In Seed.	Clean.	
	Rs.	*d. per lb.*	*d. per lb.*	*d. per lb.*
1853	263	·70	1·42	3·50
1854	525	·97	4·32	3·30
1855	195	·80	3·75	3·87
1856	5,134	·90	4·09	4·37
1857	436	1·36	5·42	5·37
1858	1,722	1·29	5·39	4·75
1856	155	1·35	5·59	....

30 per cent. is the proportion of clean to raw Cotton.

Captain Davis sent to the Agricultural Society samples of an exotic Cotton grown in the Tharawaddi district, but they were unfortunately found to be so dirty as to render any estimate of their value impossible: a sample of the Upland Georgia, grown by himself, which Dr. Brandis forwarded, was thought an excellent specimen of that kind of Cotton: but his samples of the Egyptian variety were pronounced to be poor: the Cotton showed serious degeneracy, both in color and staple.

In the Commissioner's Administration Report for 1859-60, it is stated that if any variety of exotic Cotton could be found, which

CSL

should be suited to the soils and climates of the hilly country, it would be readily accepted by the natives, and its introduction would be a great benefit to the Province: the report by Dr. Brandis, an abstract of which is given above, is quoted by Colonel Phayre to the above effect.

He says that, although Birmese Cotton cannot be exported to Europe, it does, and long has found a ready market in Eastern Bengal: but that by far the most important export is that to China, and he estimates at £250,000 the value of the Birmese Cotton which annually reaches Yunan.

In 1860-61 the Commissioner says, with regard to the foreign Cotton seed last year distributed, that in Rangoon the failure had been complete: that near Myoden, in Tharawaddi, three varieties were tried; of these the Upland Georgia failed totally: of the Sea Island a few plants only sprung up: but some of the New Orleans seed, which had been sown in a light sandy soil, grew well, and yielded a fair crop: the return is stated to have been 125 lbs. per acre.

Colonel Phayre again in 1861 addressed Government on the subject of Birmese Cotton: he gives the following statement:—

Area of Cotton cultivation in the plains *(measured)*	4,795 acres.
Area of Cotton cultivation in the hills *(estimated)*...	12,861 „
Total out-turn of raw produce..........................	2,116,320 lbs.

The Cotton grown in the plains is sown on the islands and low banks of the Irrawaddi, above the delta: sowing takes place in September, on the subsidence of the innundation, and the crop is picked in the following March: on the lower slope of the hills, in the upper part of the Province, the Cotton is sown in June and picked in February: in both cases the plant is an annual, although in the up lands a small yield is sometimes obtained in the second year.

The average yield per acre is estimated at 365 lbs. of the raw produce, equivalent to about 120 lbs. of clean Cotton: at which rate the aggregate out-turn of the Province last year would be 2,100,000 lbs.;

a general decrease in Cotton cultivation has unquestionably taken place since the British occupation of the Province: he recapitulates the causes of this thus :—

1st.—The native looms now, for the most part, weave English yarn.

2nd.—The export trade in rice has so greatly increased, and the demand for this kind of produce is so steady, that its cultivation pays better than that of Cotton.

3rd.—Recent political events in China have had the effect of checking the activity of the demand in that direction, which used to be the great stimulus to production.

The present (August 1861) average price of seed Cotton in the Pegu bazars is Rupees 9 for 365 lbs.

The figures stand thus :—

100 viss or 365 lbs. of seed Cotton costs Rupees 9, and yields 121 lbs. of clean Cotton: no less than Rupees 5 is paid for cleaning this quantity of seed Cotton, thus 121 lbs. of clean Cotton costs Rupees 14 or 2·77*d.* per lb., of which more than 35 per cent. represents the cost of cleaning.

Now, taking the whole of the Bengal Provinces, the general rule certainly is, that the cost of cleaning seed Cotton only very slightly exceeds the value of the seed; in many instances it is less: and in the great majority of cases this item of cleaning may be, and is, omitted in calculating the selling price: wherever such calculations include this charge, some set off is given for the value of the seed: and the difference, that is the nett cost of cleaning, invariably adds only a small fraction of a penny to the price per lb. of the clean Cotton.

I took the liberty of bringing this fact to the notice of Colonel Phayre, and asking him if there was any explanation of what seemed so anomalous, as that more than one-third of the nett value of the Cotton of British Birmah should be made up of a charge imperceptibly small elsewhere.

CSL

In reply Colonel Phayre states that the explanation is in reality very simple, and that it is found in the great value of labor in his province :—

" The population is agricultural, and there is no class of people who " now make the cleaning and packing of Cotton a trade.*

" The Cotton which is now exported to Bengal in Birmese boats " is taken away in the uncleaned state, partly, it is believed, because the " seed sells well in Bengal (which it would not do in Pegu), and partly " on account of the great difference in the value of labor between the two " places. All labor is costly in Pegu; a common coolie is worth eight " annas a day ; but the Birmese are good workmen, and thus, husking " rice, which is a regular employment now, can, on the whole, be " cheaply done : sawing timber, also a regular trade, is not, on the " whole, expensive, although twelve annas a day be the wages of the " sawyer ; but cleaning Cotton is not now a regular business, and " thus the cost comes to be excessive : and until it did become a " trade, the cost would be rather over than under what has been stated."

It is of course competent to intending exporters of Birmese Cotton to set up establishments in imitation of those of the Chinese merchant of former times.

Formerly not only all the Cotton of Ava and Upper Birmah used to be exported to Yunan, but (as already stated) the greater portion of the crop of Lower Birmah also : since the disturbances in China have checked the export in that direction, the Ava Cotton is sent down the river for exportation, from the port of Rangoon principally : it is estimated that Upper Birmah could turn out eight or ten millions of lbs. annually, and the quality of the Cotton is considered superior to that of the growth of Pegu.

---

* In his Report to Government, made in 1855, Colonel Phayre states that up to the year 1852 the Chinese merchants had depôts along the Irrawaddi, where they cleaned and packed the Cotton which they purchased for exportation.

The present market rate of clean Cotton is stated to be

At Ava, Rupees 30 per 100 viss, or 1·97d. per lb.
At Rangoon „ 47 „ 100 „ 3·09d. „

and this Cotton is supposed to be worth 4d. per lb. at Liverpool.*

Reviewing the history of the experiments made on the introduction of exotic Cotton, the Commissioner states that many varieties of such seed have been extensively distributed among the cultivators in Pegu: in some cases these have not germinated; in others, whether for want of sufficient care, or because the soil or climate was not well suited to the plants, the yield of the crop was not equal in quantity to that of the ordinary indigenous kind: lastly, when the crop, after more than average care and cost has been expended on it, has been picked, (besides being, as above, in smaller quantity than the common country Cotton,) there is found to be no demand for it, as small quantities of a novel kind of produce always sell rather below than above the market rates.

Thus the Birmese naturally decline to grow those exotic kinds of Cotton, as well as to make any effort to improve the quality of the native kind: the villager will indeed keep a few of the Pernambuco plants as ornaments in his garden, but he leaves its cultivation as an agricultural staple to those who desire that kind of produce: or at least waits until he can himself grow it profitably for the market.

"There are in the upper portion of the province of Pegu many "millions of acres of ground now lying waste, where it is believed that "Cotton of a quality far superior to any now known in Birmah could, "under European superintendence, be raised: it is a crop which the

---

* The nett price of clean Cotton at Ava is less than twice what the process of cleaning costs in Pegu: the difference between the Ava and Rangoon price of Cotton, which represents the charges and profits on transport, amounts to nearly 57 per cent. on the original value of the article: still formerly Cotton grown and cleaned in Pegu used to be taken *up the river* for sale at Ava: where its price ranged from 3d, to 3·75d. per lb., the latter being mentioned as excessive in 1852.

"people are accustomed to, and to the care of which they might easily "be trained: but except under supervision, they will not exert them-"selves to prepare the soil sufficiently, nor take the necessary care "with the plants, and with the picking of the pods, which appears "essential to secure the production of a long staple and marketable "Cotton."

TENASSERIM.

Districts.
MARTABAN.
MOULMEIN.
AMHERST.
TAVOY.
MERGUI.

This province seems to present many points of resemblance to Arracan: between the range of hills which runs parallel to the shore, and the coast itself, there are included low, fertile, alluvial lands, some subject to annual inundation, some just above the reach of the floods: numerous streams intersect the plains, and afford great facilities for water-carriage: Dr. Helfer describes the climate as one in which the atmosphere retains moisture throughout the year, and the rainfall is distributed very widely: and the upland ground farther to the west is stated to present all the characters already described as favorable to Cotton cultivation in the Birmese Provinces.

In 1831* Mr. Maingy of Tavoy applied to the Agricultural Society for a supply of Pernambuco seed: he forwarded a sample of some Cotton of that kind, grown there by him, in the previous year: he stated that the people were anxious to cultivate it instead of the indigenous kind, in consequence of the very much greater amount of its out-turn per acre.

The Cotton Committee reported that the sample was a very fine specimen of the kind to which it belonged, and that it was "first rate Cotton in every way."

---

* See Agricultural Transactions, Vol. II., page 214.

GSL

I find no record of the fate of the seed which was sent in answer to this application: but in 1837 Captain MacFarquhar sent from Tavoy samples of what he described as "South Sea Island" Cotton: the Cotton Committee remark that Pernambuco Cotton is sometimes thus described, and that this specimen may have been grown from the seed of those plants which, in 1831, had furnished the Cotton sent by Mr. Maingy: they state that if this be so, the sample is a very remarkable one: South Sea Island or Pernambuco Cotton is commercially inferior to American Sea Island, whereas this sample would be a very fine specimen of American Sea Island Cotton, supposing it to be the produce of that kind of seed: and it was stated to be inferior in length, strength, and fineness of fibre only to the best samples of that variety.

In 1835 Mr. Blundell of Martaban had applied to the Agricultural Society for Cotton seed: some which had on a previous occasion been supplied to him had failed wherever tried: that which he received in answer to this application was, however, very successful: as to quality the return was most satisfactory, but the crop was so short in quantity, as compared with the indigenous kinds, that he feared it could not be introduced generally among the people.

Sir Edward Ryan exhibited at a meeting of the Society a sample of Cotton given him in Martaban by Mr. Blundell: it was the produce of seed whose origin was not known. The Cotton Committee report that it is probably Pernambuco Cotton: that it is a good specimen of that variety, and worth 9*d.* per lb. at the rates of July 1836: they add that, should this prove to be the produce of some hitherto unknown indigenous plant, its discovery is of the highest interest, as it could at once take a good place in the European market.

In 1848 the Commissioner reported that Cotton was not grown in the Tenasserim Provinces, except in the Amherst district: and that what the hill people grow on their temporary clearings is not worth

CSL

taking into account, both because the quantity is very small, and because the quality is exceedingly bad.

In Amherst there were said to be only 600 acres under the crop, but that there were thousands of acres well suited to its growth: it was thought that an increased demand would greatly stimulate production. The yieldper acre was stated to be 390 lbs. (seed Cotton): the price of cleaned Cotton was 7·79*d.* per lb. in Moulmein: the seed Cotton cost 0·40*d.* per lb., and the cost of cleaning it is given as 8 annas per viss (of clean Cotton), or 5·10*d.* per lb.: or 65 per cent. on the nett cost of the clean Cotton.

Both Mergui and Tavoy are stated to grow no Cotton: they obtain what they require either from Moulmein, or else use that grown by the hill men along their eastern frontiers.

In 1848 Colonel Phayre sent to the Agricultural Society samples of a Cotton apparently indigenous to the districts of Moulmein and Amherst, and which he stated to be there cultivated (as was supposed profitably) by Mr. Burot, for exportation to France.*

The Cotton Committee considered the sample as admirably prepared for the market, clean and well picked; they pronounced it to be superior to any India Cotton and to resemble Upland Georgia.

The brokers at home thought it unfit for spinning, and saleable only for wadding, at 3*d.* to 3½*d.* per lb.†

In 1849 Messrs. Eglinton and Co. of Moulmein sent samples of Cotton indigenous to that district to the Society: they thought that if saleable in the English market, such Cotton could be exported profitably.

The Committee however considered it quite unfit for export to Europe, where it could at best fetch no more than 2*d.* to 2½*d.* per lb.

---

* Agricultural Journal, Vol. VI.: Proceedings, page 64.

† A discrepancy of this kind is so rare between the valuation of a sample in Calcutta and in England, that there may be supposed to have been some mistake as to the identity of this one.

CSL

Colonel Fytche, in his administration report for 1860-61, states that certain kinds of Cotton indigenous to the Tenasserim Provinces are of excellent quality, and have fair length and strength of staple.

The Birmese sow their Cotton crop "on the alluvia of the hill streams, left when these subside after their floods," and also on recent forest clearings: in both which situations the plant grows well: as a general rule, it seems to prefer a calcareous soil.

He states that all the attempts made in former times by Mr. Blundell and Captain MacFarquhar, to introduce exotic Cotton, specially the Pernambuco kind, have left no trace on the general crop of the country: the natives dislike these foreign kinds, and even their own Cotton is not a favorite crop: it is stated to be uncertain, and even when successful, not more remunerative than the average of other crops: moreover, although the numerous streams afford extraordinary facilities for cheap carriage, labor is so very scarce that the aggregate area covered by the crop is but small.

The following returns are given for the Amherst district* :—

Years.	Number of acres under Cotton.	Out-turn in mans.	Amount of export in lbs.
1856-57	325	1,398	....
1857-58	315	1,354	112,828
1858-59	379	1,628	202,158
1859-60	320	1,375	192,602
1860-61	211	907	118,270

The average yield per acre is stated to be about 340 or 350 lbs., and the seed Cotton is exported.

The average price is Rupees 15 per man, or 4·5*d.* per lb., and the Amherst Cotton is said to be worth Rupees 24 per man at Moulmein, or 7·2*d.* per lb.

---

* It is not quite clear whether these figures may not be intended to include more than the Amherst district.

CSL

With reference to the experiments above alluded to, it is said that although they failed in attaining the object for which they were instituted, they nevertheless satisfactorily proved that Permambuco seed grows well in Amherst, and could, under favorable conditions, be cultivated there on a great scale; no such enterprise could, however, be entered on with any prospect of success in the present thinly populated state of the district.

SINGAPORE.

The present question of Cotton supply has, I believe, little to do with Singapore*: but the following short notices of experiments made there in former years are, nevertheless, here reproduced, as they appeared in the Transactions of the Agricultural Society of India in connection with the records of Indian experiments, and may, perhaps, be considered as rendering this compilation less incomplete.

Mr. Piddington speaks of the soil of Singapore as particularly well suited to the Cotton plant: and incidentally mentions an experiment which he had himself carried on there.

In May 1836 the Agricultural Society sent to Singapore a set of exotic Cotton seeds, consisting of New Orleans, Upland Georgia, Sea Island, and Egyptian, part of a supply presented to the Society by Lord Auckland: no record of the fate of these seeds appears. In 1837 the Society's Cotton Committee reported on samples of exotic Cotton grown at Singapore, but not of any of the varieties above-mentioned: these were of *Pernambuco,* which was pronounced to be harsh, coarse, and weak, and a very bad specimen of the kind to which it belonged, and of Bourbon, which was considered good fair Cotton, having a fine, silky, long staple, but rather weak, and valued at 9*d.* per lb. at the rates of July 1836.

---

* Profitable crops of other kinds are supposed already to occupy the available space.

CSL

In this same year (1837) Mr. Crane submitted to the Agricultural Society samples of Cotton grown at Singapore, which he described as a Manilla variety of the plant.

The Cotton Committee pronounced it to be American Upland Georgian Cotton, and considered the sample, as "without exception, the most perfect, beautiful, and largest in pod ever grown in India." It was stated to have been grown on a sandy soil, near the sea, and the Committee are of opinion that the experiment, of which it is the result, held out the most encouraging prospects of successful cultivation on a large scale.

ANDAMAN.

In June 1860 Captain Houghton, Superintendent of Port Blair, sowed about half a biga of ground with New Orleans seed, supplied to him by the Calcutta Chamber of Commerce: the seed was scattered broad-cast, but his Chinese gardener finding that it had not begun to germinate, collected it all after a few days, and dibbled it into the ground, leaving about one-fourth of the original area bare of seed: in October the plants were vigorous, and beginning to yield, and they continued to bear until the middle of April, when pods and leaves all dropped off: the crop gathered was 27lbs. in all—7lbs. of clean Cotton, and 20lbs. of seed.

He had given some of the seed to the Hindustanis on the Island, who sowed it in the same ground with other things, the result of which was, that their plants were stunted, and yielded a still smaller crop than his own.*

Captain Houghton subsequently reported that on the 12th July 1861 the plants looked very much more vigorous than they ever did before: and that although he had been disappointed in the amount

---

* Agricultural Journal, Vol. XII.: Proceedings, page 52.

CSL

of the yield he had obtained from them in the first season, which he believed to be very much below the out-turn of the same kind of Cotton in America, he intended to prosecute the experiment farther, and did not consider it in the light of a failure. *

---

* Agricultural Journal, Vol. XII. : Proceedings, page 61.

CSL

TABLE I.

Prices of Cotton in eighteen Bengal District Bazars—Annual Average.

(Pence per Pound.)

Divisions.	Districts.	1764.	1777.	1789.	1790.	1831.	1836.	1848.	1854.	1855.	1856.	1857.	1858.	1859.
Patna ..	Patna ..	......	......	......	......	......	3·63	2·07	2·52	2·52	2·59	3·20	5·50	5·50
	Chumparun ..	......	......	......	......	......	......	2·63	2·90	3·00	3·20	4·00	6·95	6·30
	Shahabad ..	......	......	......	......	......	5·00	3·00	3·00	2·66	2·82	3·42	4·80	5·75
	Tirhoot ..	......	......	......	......	......	......	3·00	3·00	3·20	3·00	3·42	6·00	6·20
Bhaugulpore ..	Monghyr ..	......	......	......	......	......	4·44	3·50	3·30	2·42	3·20	4·00	6·33	7·80
Rajshaye ..	Rungpore ..	......	......	......	......	......	......	1·90	3·06	3·07	3·77	4·00	6·99	8·16
	Moorshedabad ..	......	......	......	......	......	4·80	3·20	3 00	3·24	3·00	3·20	6·16	7·75
Nuddea ..	Jessore ..	......	......	.....	......	......	......	3·00	2·40	3·13	3·20	4·80	7·23	7·27
Burdwan ..	Burdwan ..	......	......	......	.....	......	4·00	3·63	3·41	3·69	3·20	3·20	6·56	5·74
	Midnapore ..	......	......	......	......	......	4·80	4·39	3·70	3·69	3·07	4·85	6·89	6·98
Cuttack ..	Cuttack ..	......	......	......	......	......	......	4·39	3·31	3·69	3·10	3·69	5·14	6·00
Dacca ..	Mymensing ..	......	......	......	......	......	......	3·00	3·40	4·00	4·00	4·36	6·72	6·00
	Cachar ..	......	......	......	......	......	......	·96	·90	1·23	1·02	1·03	1·60	2·17
	Dacca ..	0·66	0·76	1·69	1·20 3·00	1·27	3·69	3·25	3·41	4·00	3·07	3·69	6·00	7·48
Chittagong ..	Chittagong ..	......	......	......	......	......	......	2·80	3·30	3·70	3·05	4·00	6·95	7·02
	Tipperah ..	......	......	......	......	......	......	2·70	1·75	3·42	4·00	....	6·00	6·57
Assam ..	Gowalparah ..	......	......	......	......	......	2·08	2·66	1·20	2·52	2·66	3·00	5·55	4·80
	Darjeeling ..	......	......	....	......	......	......	......	4·80	6·00	6·00	6·00	8·00	12·00
Average of Bazars ..		......	......	......	......	......	4·05	2·84	2·89	3·35	3·21	3·67	6·04	6·58
Calcutta ..	Highest ..	......	......	.. ...	2·52	2·25	3·15	2·55	2·46	2·74	2·85	2·85	5·10	4·20
	Lowest ..	......	......	......	2·14	4·15	4·65	3·45	3·37	3·26	3·30	4·50	6·15	6·15
Liverpool ..	Mean average of Indian Cotton ..	......	......	......	......	5·25	5·75	3·25	3·50	3·87	4·37	5·37	4·75	4·75

TABLE II.

Abstract of the Replies of the Bengal Revenue Officers to the six Questions circulated in 1848.

DIVISIONS.	DISTRICTS.	Price of clean Cotton in principal marts.	Cost of transport to Calcutta.	Produce per Acre.	Area under the Crop.	Could be added.
		d. p. lb.	*d. p. lb.*	*lb.*	*Acres.*	*Acres.*
PATNA	Patna	2·70	0·05	85	1,250	1,250
	Shahabad	3·00	0·10	96	2,600	....
	Behar	3·30	......	96	....	....
	Tirhoot	3·00	......	170	4,000	....
	Sarun	2·85	......	80	....	....
	Average	2·97	0·07	125	....	....
BHAUGULPORE	Monghyr	3·50	0·07	88	1,500	....
	Purneah	3·50	0·04	......	....	....
	Bhaugulpore	....	......	......	....	....
	Average	3·50	0·05	88	....	....
RAJSHAYE	Rungpore	1·90	......	......	....	....
	Dinagepore	3·01	0·07	......	150	....
	Malda	3·15	......	......	....	....
	Rajshaye	3·00	0·04	180	....	....
	Moorshedabad	3·20	0·06	90	100	60
	Average	2·85	0·05	130	....	....
NUDDEAH	Nuddeah	3·45	......	160	700	700
BURDWAN	Beerbhoom	3·00	......	190	500	....
	Burdwan	3·80	0·09	105	5,000	5,000
	Bancoorah	3·00	0·15	140	6,000	2,000
	Hooghly	3·15	0·01	165	3,000	3,000
	Midnapore	4·39	0·05	190	3,450	296,550
	Average	3·47	0·07	158	....	....
CUTTACK	Cuttack	4·39	0·30	192	10,100	....
	Balasore	4·00	......	160	1,485	....
	Pooree	5·00	......	......	10,390	....
	Average	4·46	0·30	176	....	....

CSL

TABLE II.—(*Continued.*)

1848. DIVISIONS.	DISTRICTS.	Price of clean Cotton in principal marts.	Cost of transport to Calcutta.	Produce per Acre.	Area under the Crop.	Could be added.
		d. p. lb.	*d. p. lb.*	*lb.*	*Acres.*	*Acres.*
DACCA ..	Cachar ..	2·10	0·05	170	700	....
	Sylhet ..	3·74	0·06	190	1,000	....
	Mymensing ..	3·00	......	......	....	....
	Dacca ..	3·60	0·04	200	....	....
	Furreedpore ..	3·00	......	......	....	....
	Backergunge ..	2·80	0·06	210	2,000	4,000
	Average ..	3·04	0·05	192	....	....
CHITTAGONG ..	Tipperah ..	2·60	0·07	......	....	....
	Bullooah ..	2·50	0·03	80	....	....
	Chittagong ..	2·88	0·07	......	....	....
	Average ..	2·66	0·06	80	....	....
CHOTA NAGPORE	Hazarebaugh ..	4·00	0·53	......	....	....
	Poorulia ..	3·75	0·09	......	....	....
	Average ..	3·87	0·31	98	....	....
ASSAM ..	Gowalparah ..	2·66	0·07	200	....	....
	Nowgong ..	2·50	......	160	....	....
	Kamroop ..	3·00	......	90	1,200	60,000
	Luckimpore ..	2·80	......	......	....	....
	Seebsagur ..	2·75	......	......	....	....
	Average ..	2·74	0·07	150	....	....
ARRACAN ..	Akyab ..	3·80	......	......	....	....
	Ramree ..	3·75	......	......	120	....
	Aeng ..	6·00	......	......	70	....
	Sandoway ..	4·00	......	180	380	1,120
	Average ..	4·39	......	180	190	....
TENASSERIM ..	Amherst ..	8·30	......	......	600	....
	Tavoy ..	....	......	......	....	....
	General Average, excluding the Tenasserim price ..	3·40	0·11	137	....	....

CSL

TABLE I.

The annual average of the price of Cotton, as given in this table, for the Bengal bazars, has been calculated from the monthly price current lists, which, until 1859, used to be forwarded to the Revenue Board by the different Collectors. I have been told that they are no longer called for, in consequence of their supposed inaccuracy: it was found that the subordinate officers of the department, who used to report the prices for the different district markets, either through carelessness, or fraud, introduced errors, which of course vitiated the statements compiled in the Collector's office.

If, however, it is remembered, that each entry in this table is calculated for a district, including often several markets, from each of which a monthly return was made by different persons, and that twelve such returns are included in every average, and represented in each such entry, it is not, I think, rash to assume that inaccuracies, whether accidental or intentional, will have counterbalanced each other, and that the figures may thus be considered as tolerably close approximations to the truth. Such, at least, are their claims to confidence.

It is unfortunate that the earliest information to which I have had access was for the year 1838, which was an exceptional one: the price of Cotton in Bengal having been that year certainly greatly affected by the bad seasons of 1837 throughout the North-West Provinces. It is equally unfortunate that there were not data for carrying on the table to the present date, for unquestionably the prices of Cotton in Bengal were greatly enchanced in 1858-59 by the mutiny year of 1857.

Notwithstanding those disadvantages the figures are given: I believe it will be found that the small and gradual advance between 1848 and 1857 inclusive, from 3·40*d.* to 3·67*d.* per lb., furnishes a true index to the state of the case.

No figures that I have had access to, tend to confirm the assertion so often made, that there has been a falling off in the price of

CSL

Cotton.* It is true that we are told the Dacca spinners could, in 1790, afford to give 3*d.* per lb. for a Cotton carefully grown, to meet a special and limited demand, at a time when they could buy the Surat Cotton for 2½*d.* per lb., and that of Northern and Western India for 2*d.*: but the market rate of the general crop of the district was at that time under 1½*d.* per lb.

I had prepared a column of figures for this table, to represent the average price of a food staple during the same period: taking rice for Bengal: but I have had reason to think that the result I arrived at was vitiated through want, on my part, of the special knowledge required for a really just appreciation of the fluctuations of price in such a case: and I preferred, as already stated, to assume, in general terms, as true, the assertion so often made on good authority, and so generally accepted, that the general value of agricultural produce has rapidly advanced, while the price of Cotton has done so but very slowly, a state of things which is of course practically equivalent to a retrogression on the part of the latter.

The line of figures representing the average of the provincial market rates will show that they are, as a rule, a little above those of the Calcutta bazar; with regard to the line showing the price of Cotton in Liverpool, it should be remembered that the figures represent the price of Surat Cotton: and are, consequently, higher than the Cotton represented by all the other figures would have fetched: if bearing this in mind, we add something (say ¾*d.* per lb.) to the Calcutta bazar rates for packing, commission, and freight, it will be seen how seldom it would have been profitable to export Bengal Cotton to the English market during the last few years.

TABLE II.

This table is a reproduction of the information contained in the replies to the six questions so often already referred to.

---

* This statement is made with the full consciousness of the fact that more extended and searching analysis might have led to a different result. This book was, it should be remembered, compiled between the 1st November and the 5th December.

GSL

The first column indicates a price at which Cotton could not be profitably grown in Bengal : it is that of the imported Cotton : the local crop could almost every where command a slightly higher price : but has never been stimulated into competition by the advantage : beyond this fact the figures convey little information.

The second column shows how low the cost of transport is for the greater part of the province : Hazarebaugh, Bankoora, Cuttack, and parts of Shahabad send their Cotton on carts, and of course at a greater cost than any of the districts which have the advantage of water-carriage.

The figures representing the area actually under the Cotton crop, and that to which it might be extended, are inserted whenever they were given with apparent exactness by the officers reporting : many of them, however, did not give figures, but only stated in general terms that about so many bigas, or doons, or koolbas were, or might be, cultivated : often not explaining the equivalents of the local terms employed.

CSL

Section II.

BENGAL UPPER PROVINCES.

INTRODUCTION.

"THE North-West Provinces" may be conveniently considered as the upper valley of the Ganges, or as the Ganges valley itself, if we consider the whole area of the newer alluvium as a tract belonging to the Bramaputra, and to other rivers in common with the Ganges. In its climate, its soils, consequently in its agriculture and its inhabitants, this territory presents many points of dissimilarity to the country below it to the south-east: but although the contrast, in all their physical aspects, between the Hissar country and Backergunge, is as strong as could well be imagined, yet, the transition is nowhere violent: the fiscal boundary, indeed, which separates the North-West Provinces from Bengal Proper, is purely conventional, and no physical demarcation exists between Goruckpore and Chumparun, or between Ghazeepore and Patna or Shahabad. Still, although gradual, the transition soon leads to differences pretty strongly marked, and the country below the junction of the Ganges with the Gogra is certainly very different from the tract extending westwards from the confluence of the Ganges and Jumna at Allahabad.

General aspects.

The changes which the aspect of the country undergoes are throughout described as gradual rather than sudden, and there does not appear to be any necessity for, nor should we gain any useful object by, insisting on a physical classification of the area of these provinces, as was found convenient in the case of Bengal: our information is indeed much more scanty here, as far at least as I have had access to it.

THE DOAB.

The well-known and often described tract lying between the Ganges and Jumna, might be supposed to be definably distinct from every other part of Hindustan: nevertheless, every description which I have found of the country lying between the Ganges and the mountains, repeats the same expressions of wonder at the extreme apparent aridity of the land during one part of each year, and of admiration for its teeming fertility during another part, of which most accounts of the famous Doab are made up: the same demand for irrigation works is made, as well as similar promises of endless supplies of Cotton, as a necessary result of the construction of canals. Thus, from Rungpore on the Bramaputra, to Saharunpore at the head of the Doab, the transitional character is quite as well preserved as it is down the centre of the great valley from Paniput to Patna. As far, then, as our information goes, the Doab and a great tract between the Ganges and the Terai must be taken as forming a single area physically considered.

TERAI.

There is, however, a narrow band of country stretching along the immediate foot of the hills, which, although in area insignificant, is physically distinct from the great valley to the south of it: the swamps and forests of the Terai have been often described: Dr. Campbell has given us an account* of the Darjeeling Morung, which is part of it, and of the Cotton cultivation there carried on. It is often mentioned by those who have described the countries lying north of the Ganges from thence to the west: and Mr. Finnie assures us that the part of it which he saw in and near Kumaon, is reclaimable, and admirably suited to grow American Cotton; we are also often told that the excessive moisture which renders a residence impossible to Europeans, might be made to spread abundant crops over desert wastes in the plains beyond.

---

*See ante.

MINISTRY OF CULTURE · GOVERNMENT OF INDIA
सत्यमेव जयते
संस्कृति मंत्रालय · भारत सरकार

CSL

BUNDELKHUND.

Although all agree in telling us that the soils along the right and the left banks of the Ganges are identical in all roughly appreciable characters, this is not the case with the right and left banks of the Jumna: below Delhi at least it is not so, although north of that place no differences have been, as far as I know, noticed.

The province includes between Delhi and Mirzapore, and south of the Jumna, a portion of Bundelkhund: this band of country is physically distinct from the Gangetic valley, which it bounds in this direction: indeed, we are told that even those portions of it which lie in that valley, and form alluvial flats along the river, are made up of soils quite unlike those of the Doab. The American planters insisted on this, and expressed their belief that the soils of Bundelkhund were much better suited to the Cotton plant than those north of the Jumna. Many others before and since have done the same, more or less positively: the undulating character of much of this part of the province, and its hilly aspect in some places, serve to contrast it strongly with the great plain to the north.

The North-West Provinces of Bengal are thus physically divisible into the narrow zone of the Terai on the north, the great valley of the Ganges, and the small portion of Bundelkhund, which their fiscal boundaries include on the south; and the prominent character of the whole of the central area is the gradual change which obtains between Ghazeepore and the Punjab frontiers, the soil to the westward becoming more and more sandy and arid, while the climate at the same time is less and less equable.

The high water-mark of the Ganges at its junction with the Jumna at Allahabad is a little less than 400 feet above the sea: the highest part of the valley near Saharunpore is about 1,000 feet above the same level: as the ground imperceptibly rises, the transition above-mentioned takes place: in the eastern districts we first hear of wells

CSL

of irrigation as important, then essential: farther on of those droughts which seem to render Cotton cultivation, without irrigation, too precarious to be permanently profitable on a great scale: until we reach the sandy flat lands west of the Jumna, which, in the words of Mr. Finnie, "want only water to be the garden of the world."

More detailed knowledge of special peculiarities.

It is perhaps too obvious to need mention that a few general facts of this kind, however interesting and important, furnish only the first elements of a knowledge which is quite essential to the success of any great agricultural undertaking: here, however, we are at fault; but although the nature of our information leaves us in ignorance of all, save the great leading features of these provinces,—as indeed of all other parts of India,—yet there must be many differences of soil and climate prevailing in its various districts, of the highest importance in an agricultural point of view: of such we seldom hear any thing in the accounts given of the various experiments that have been made; but it is impossible to escape the conviction that among them will be found the explanation of the mutually contradictory results which we find recorded of trials, made under circumstances, identical in appearance only, because such matters were left unnoticed: we are told of certain chemical constituents of the soil, where the excess of some of them is sufficient to render a tract of country nearly or perfectly barren, and where an efflorescence of soda or saltpetre is gathered for commercial purposes: but we never learn any thing of the presence of such ingredients in the soil as long as any crops can be raised from it: and although the young Cotton plant may have withered and died, only because it was unable to struggle against some local, and perhaps adventitious admixture in the soil where its seed was sown, we are only informed that the country did not suit that variety of Cotton.

CSL

Experiments in the cultivation of exotic kinds of Cotton.

The reader, in drawing his conclusions from the recorded results of the experiments made on exotic Cotton growing in the north-west of India, will, of course, make allowance for such differences, as well as for such considerations as are suggested by Mr. P. Saunders in a passage of his late Report, which will be quoted in extenso a few pages on. The history of the proceedings of the American planters will also suggest many reflections, but little of a positively useful character can be learned from the records of their failure, beyond the bare fact itself. They failed, and no one need again try the methods they employed: but the future Cotton planter will find in their experiences little to guide him in his selection of a kind of seed more likely than another to succeed, or what, if any manure should be employed, in which, if in any, soils.

Mr. Bruce and Mr. H. H. Bell have expressed their opinions strongly as to the preference which ought to be shown to Bundelkhund over the Doab as a Cotton-growing country: as a matter of fact, the crop has there been long a favorite one, and the general tendency of the evidence furnished by experiments is, in accordance with those gentlemen's opinion, in favor of the country south of the Jumna.

Irrigation.

As to the great plain itself, all seem to agree that Cotton of a fine quality cannot be grown without the aid of irrigation; none of the experiments can perhaps be considered decisive as to whether, by the aid of irrigation, such Cotton could be profitably cultivated on a large scale: Colonel Skinner made a crop of Upland Georgian Cotton pay its expenses, in presence, too, of many disadvantages, and the result of his trial at least suggests that profitable cultivation is not physically impossible. But, as we have already seen, the possibility of making a Cotton crop pay its expenses, is not the aspect which the question of an extension of that crop assumes in practice, when

CSL

the means of irrigation are introduced into a district: it is, on the contrary, the amount of profit obtainable from the Cotton crop as compared with others to which the water could also be applied, which decides the area of its cultivation. So far, we know, that in the tract of country brought, during the last twenty years, within the influence of the great canals of Northern India, this question has not been decided in favor of Cotton. Whether the gross annual out-turn has fallen off, as is asserted by some, or remained pretty stationary, as others believe, it certainly has not augmented in proportion to other staples of agriculture, within the artificially irrigable zone of the canals. This fact is variously explained: some hold that it is due to the decline of the Cotton export trade, and to the consequently decreased demand for the produce: some think that it is simply because the water supply gives the cultivator the command of advantages which he can more profitably apply to other crops than to Cotton, even were the export trade as flourishing now as it ever was: and, as a matter of fact, it remains for future trial to determine whether it be possible successfully to cultivate a kind of Cotton which, bearing a higher price per lb., and yielding larger quantities per acre, would return a better profit for a given area than that now grown, and this to an extent which would render it remunerative in comparison with other irrigated kinds of agricultural produce.

Mr. Secretary Muir, in a letter dated February 1849, summed up the information collected from the revenue officers of the North-West Provinces, in the form of replies to the six questions circulated by order of the Court of Directors in 1848.

Mr. Muir's epitome.

The area cultivated for Cotton was reported to amount to 1,002,040 acres, which it was estimated might be extended to 1,689,662 acres: this, however, includes a considerable area, which must be left out of account in calculations made in reference to importations to Europe: Mr. Muir includes Rohtuk within the area from which supplies might, he conceives, be obtained for the European market, and all the right (or Bundelkhund) bank of the Jumna: he excludes all that portion of the Doab lying north and west of Allyghur, which tracts, he says, export their surplus Cotton towards the north into the hills, or towards the Sikh states on the north-west: he also excludes all Rohilkund, partly on the grounds that it also finds a market for its surplus Cotton on the north and north-west, and also because what is exported from a portion of the Budaon district, down the Ganges, is stated to be of a very inferior quality: he also excludes the Benares division, believing that, “however well situated it is as respects exportation, and whatever may in future be effected in realization of the “ Commissioner's expectations, various prejudices have hitherto operated against its natural advantages, so that the quantity it at present “ yields is insignificant.” Narrowed thus, the area of Cotton cultivation within that portion of the country likely to afford supplies for Europe, is stated to be 829,753 acres, capable of being extended to 1,474,801 acres.

He considers the average bazar prices of Cotton for the whole Province to be a little under Rupees 8 per man (2·4*d.* per lb.).*

The cultivator, he thinks, can sell it at 2·36*d.* per lb.,† and, when he receives advances, at 2*d.* per lb., but the system of giving advances is not believed to be generally in force: it used not to be resorted to in the case of the investments formerly made for Government, and Mr. Muir deprecates its introduction.

Cotton is always cleaned by the churka, and that prepared for exportation is not *bowed:* but this process is always applied to the Cotton for local sale. “ The practice is to give the seed, or a portion

---

* Mr. Muir takes the Rupee at one shilling and ten pence, and gives this price as 2·1*d.* per lb.

† If this be generally true, no very great saving can be anticipated by getting rid of the middleman here, who is elsewhere supposed to intercept so disproportionate a share of the profits.

CSL

"of it, as remuneration for cleaning; when money is given it ranges "from six annas to more than a Rupee per man, the weight of the "clean Cotton being understood: and four mans of Cotton with the "seed usually yielding one of the clean staple."

The cost of transport to Calcutta was very variously estimated by the different revenue officers: after taking the average, and making allowances for some extreme cases, Mr. Muir states that for the whole province it may come to fifteen annas seven pie per man up to Mirzapore: from that place Rupees 1-4 appeared to be a pretty regular charge per man, so that the total cost to Calcutta might be taken to average Rupees 2-3-7 per man, or ·66*d.* per lb. Mr. Muir includes in this such charges as brokerage, cost of weighing, packing, gunnies, porterage, commission, guards on boats, Government dues, insurances, hoondees (or charges on bills), and pilotage. I find that when Mr. H. H. Bell sent his Cotton from Agra, these charges amounted to a very large portion of the total sum set down as cost of transport: if they be excluded and the cost of transport be confined to freight, or boat-hire only, he had his Cotton (304,866 lbs.) conveyed from Agra to Calcutta for Rupees 2,513-11-4, namely, ·13*d.* per lb.

I find it stated by some of the best authorities on the* subject, that "the cost of conveyance of a bale of 400 to 500 lbs. of Cotton, a distance of a thousand miles on the Mississippi, has been as low as one "dollar, and ranges from that sum to one and a half dollars." Taking one and a quarter dollar as the cost of 450 lbs., this is ·14*d.* per lb. Figures cited in this way are liable, of course, to the most violent misinterpretation, and I do not know if such charges as packing, gunny bags, and insurance are included in the cost of transport as given for America; if so, the comparison instituted is useless: if, however, it implies merely freight, it may be perhaps well to remember that the Agra Cotton did not travel much less than 1,000 miles before it

---

* See Mann "Cotton Trade of Great Britain, page 70. Mr. Ashworth cit.

CSL

reached Calcutta, and to record the fact along with a statement quoted by Mr. Mann in his late able work, from a paper written by General Briggs in 1839, and referring to a long anterior period, to the effect that the Nagpore Cotton, exported by way of Mirzapore, cost 2½*d.* per lb. for transport alone.

Although the recent report* on Cotton cultivation in the Gangetic Doab will be familiar to every one who is interested in the subject, I shall make a few short extracts from it here, as the latest authority on record. "The soil of this territory is generally a light sandy soil of "considerable depth, and great fertility when it receives the ferti-"lizing influences of both sun and rain in alternate due proportions, "but remains a barren waste during the long droughts that occasionally "occur, in all places that cannot be reached by irrigation. It is well "adapted to the growth of Cotton, which requires a porous soil, and "from its long tap-root, a considerable depth of it.

"The country is not subject to inundation, nor have I ever "seen much damage done by excessive rains. The season most "important for the cultivation of Cotton and many other articles of "produce is the rains, and in my experience of nearly a quarter of a "century, I must state that there is scarcely one year in ten when "the rains are uniform throughout, and the harvest is what is usually "termed a bumper one. Generally there is a most injurious break "in the rains, sometimes from eighteen to twenty days, in July, and "sometimes from eighteen to twenty-one days, in August. These "temporary droughts check the growing crops to such an extent as to "make all the difference between a bad and a good harvest. To "Cotton, which requires moisture with no great interval of cessation, "especially when in flower, these droughts are very injurious. Hence

---

* "Report on the Cotton districts of the Doab and the obstacles that impede the trade in Cotton."—P. Saunders, Sr., Esq., Commissioner to report on the cultivation of Cotton, dated Roorkee, 1st September 1861.

CSL

" the vast importance of irrigation. If the crops be irrigated during " those temporary droughts they will be abundant.

" Thirty, forty, and fifty years ago, there was a considerable trade, " in Cotton, and it was largely exported to China and England. The " merchants and planters of the North-West had Cotton factories and " Cotton screws at Futtehghur, Calpee, and Mirzapore. They pur- " chased the Cotton from the native, and cleaned, screwed, packed, and " exported it to China and England. But the trade gradually died " away. The exporters were unable to compete with the Cotton " grown in the Southern States of America by slave labor and on " lands that paid no Government revenue. The factories were allowed " to go to ruin, and the Cotton screws rotted away.

" The present trade in Cotton has been carried on almost exclu- " sively for the last thirty years by native merchants, and only for " export to other parts of India, for home consumption, and a few " thousand mans to China. Several attempts were made by the " East India Company to revive the trade: but they were galvanizing " a dead body. The native consumers did not care for American- " grown Cotton, and were not particular on the subject of cleanliness. " That alone, which would have given life and vigor to the trade, was " wanting, namely, a demand from beyond sea. The European settlers " took little or no interest in the movement, and the American Cotton " gins shared the fate of the old screws of Futtehghur and elsewhere, " and the trade continued without change in the hands of the natives. " For the last three years there have been some curious changes in the " Cotton trade. After the mutiny year, in consequence of the small " supply, prices almost doubled. I have it on the evidence of several " native Cotton merchants, that in 1858 prices went up to 22 Rupees " the man of 100 lbs. at Mirzapore and Ghazeepore, the prices in " the growing districts being 10 Rupees a man. The usual results " took place, and more Cotton was grown than could be consumed;

"prices fell to 15 and 14 Rupees a man, at which they remain. I "have it on the evidence of several native merchants, that there are "more than 50,000 bales of Cotton at this moment at Mirzapore and "Ghazeepore, for which they cannot find purchasers. While, then, "they hear on all sides that supplies of Cotton to England from America have failed, while they are told that a great trade will spring "up, and that hundreds of thousands of bales are wanted, while they see "Cotton seed distributed in all directions, and pamphlets teaching "them how to cultivate Cotton, circulated among them, they are confounded by the astonishing fact that there is not a single purchaser "among them; that their stocks of Cotton are lying rotting at the "marts of Mirzapore and Ghazeepore, and that the cry from Lancashire is merely a voice and nothing more. Under these circumstances, it will surprise no one to know that the breadth of Cotton "sown this year has been influenced only by their own probable home "demands, and has in no wise been stimulated by the accounts from "America or elsewhere. The land-owners admit, however, that a "greater breadth of Cotton has been sown this year than usual, owing "to the early rains, which are always favorable to an abundant Cotton "crop.

"When a real demand for Cotton comes from England, and Cotton "ceases to be grown by slave labor in the Southern States of America, "a large and immediate supply could be sent from these Provinces. "For a trade in Cotton such as England would consume, European "superintendents and European capitalists are indispensable. There "is no doubt that with proper cultivation the native Cotton would be "largely improved in color, fibre, and staple, and the exotic varieties, "such as Egyptian and New Orleans, would grow well. The European capitalist is required to advance funds to the grower, to teach "him to cultivate and pick his crop, to erect factories, and import "screws for the purpose of cleaning, screwing, and packing the Cotton.

" I am convinced that in these densly populated districts, Europeans " can never cultivate Cotton on a large scale. Every man, woman, " and child in the country would steal it, and as the picking of Cotton " occupies nearly two months, the European growers would not house " one-third of their crops. All agricultural produce that the natives " can eat or use, such as grain or Cotton, can never be grown on a large " scale by Europeans, but they may, with great advantage, have small " plantations attached to their factories, to show the people how to " cultivate, the greater profits of good cultivation, and be enabled " also to distribute good seed among them.

" The Manchester Cotton Supply Association, with their million of " capital and determination not to engage in the cultivation of Cotton, " could operate very advantageously in these Provinces, without " infringing the rule or principle they have laid down for themselves. " If they desire to do so at once in anticipation of a greatly diminished " supply from America, the field, and a very extensive field it is, " lies open before them : but it is not probable that Europeans settled " in the country, remembering past disasters, will take the intiative " in a trade requiring an outlay of capital for building and machinery, " until the American question is settled, and a real, and prospectively " permanent demand is secured to them.

" I have no doubt from the plants of Egyptian and New Orleans " Cotton that I have seen in different parts of the Doab, that climate and soil are well suited to their growth, and that wherever " failures occur, they are to be attributed either to bad seed, or unskilful culture, more frequently the latter. A planter at Mynpoorie " informed me that he had received a supply of New Orleans seed " from the Agricultural and Horticultural Society, that he had " sown some hundreds of bigas, but that none of it had germinated. " He said this had greatly discouraged him, and many native " zemindars, who were watching the experiment, and they had all

CSL

"come to the conclusion that the soil and climate were not suited to "that kind of seed. On enquiring how he had sown, I elicited from "him, that by the advice of a native, he had steeped the seed in hot "water. He admitted that he had not superintended the sowing of "it himself, and could not say how hot the water was. I travelled "to Futtehgur and visited a small plantation of Mr. F. C. Bryant, "who had been supplied by the same Society with the very same "seed. The whole of it had germinated well, but here again a want "of knowledge had led Mr. Bryant to the conclusion that soil and "climate were not suited to the plant, as it was sickly, yellow, and "stunted. The seed was sown with the first rains in June, and to the "day that I saw the plantation (the 5th of August) the soil had never "been disturbed by hoe or plough. The soil of the field had been "beaten hard by the rain and baked by the sun. The plants were "strangled by the hardness of the earth around them, and maintained "a sickly and feeble existence. Mr. Bryant candidly admitted that "he did not know that the soil ought to be turned up. Where "I am writing at this moment, there is within view a field of magnificent Cotton trees, from New Orleans seed, belonging to Colonel "Turnbull, and although they have not been cultivated as they might "have been, the trees having been allowed to run too much to wood, "they demonstrate by their size and vigorous growth how well "climate and soil are adapted to the exotic plant."

The Map.

The map has, for this province, been arranged as for Bengal, in accordance with the Revenue Board returns, and may be considered as representing a general view of an approximately correct statement of the production and consumption of Cotton as it existed a few years back: it is hoped that although laying little claim to accuracy, and still less to completeness, it may be found convenient by any one desiring to take in at a glance the general aspect of the country

CSL

from the point of view of its capabilities as a source of Cotton supply.

BENARES DIVISION.

Districts.
GHAZEEPORE.
AZIMGHUR.
GORUCKPORE.
MIRZAPORE.
BENARES.
JOUNPORE.

The tract of country which constitutes the Benares division stretches from the Nipal Terai and the foot of the Himalaya to the Bundelkhund table-land, and includes a small portion of the plateau, as well as of the Soane valley to the south of it: the territory is traversed from west to east by the Gogra, the Goomtee, the Soane, and the Ganges itself, of which the other rivers are confluents: this, of course, gives the several Districts very considerable advantages as to means of transport. I am not aware that the true Gangetic alluvium is found within either the Ghazeepore or the Benares Districts,—if so, it is to a small extent only, and the formation may, for all practical purposes, be considered as confined to the Lower Provinces of Bengal. The various soils of the older alluvium are, in the Benares division, as they are farther to the east, of great fertility. A comparatively insignificant portion of the division, in the south of the Mirzapore district, belongs to the upland jungul area, and presents such general characters as have been already described in our notice of the adjoining districts of Rhotas (in the Patna Division), and of Palamow (in Chota Nagpore): with this exception, the whole of the Benares division is a rich flat country of great agricultural capabilities.

In 1848 the Commissioner reported that in the districts under his management the cultivation of Cotton was little more than nominal: the crop was sown in the same ground with others, and no where carefully tended: it was in many places an object of superstitious aversion, and often, when a few plants had struggled to maturity, they were left to be devoured by cattle, after a few of the bolls had been picked to meet present domestic requirements.

He states the average price for the division to be 2·84*d.* to 3·13*d.* per lb.

In estimating the average yield of clean Cotton per acre, there is a difficulty created by the fact, that although the produce of the better kinds of Cotton is 50 per cent. less in a given area than that of the inferior kinds, yet that of this raw produce, two-thirds in the case of the former, and three-fourths in that of the latter, consist of the weight of the seeds.

The estimation of the quantity of land under Cotton cultivation is also very difficult, owing to the above-mentioned intermixture of crops, and to the fact of the Cotton being sown in patches along the skirts of fields: after applying all practicable correction he finds the area to be 25,000 acres.

He thinks that the soils of the division are generally unsuited to the Cotton crop, and that an increase of price would not induce the cultivators to substitute it for any of their present agricultural staples.

GHAZEEPORE.

The Ghazeepore district stretches southwards along the left bank of the Ganges from its junction with the Gogra, and includes also a small area on the right bank of the former river; its soil is exclusively alluvial.

In 1848 the Collector stated his belief that the soil and climate of Ghazeepore were not suited to Cotton: the crop was not considered remunerative, and the plant was never grown by itself; there were about 160 acres, which it shared with other kinds of produce; the imported Cotton averaged 3·35*d.* per lb. in the bazars, and was sold by retail in the villages for 3·43*d.* per lb., at which latter price any of the Cotton grown in the district, whichever appeared for sale, was to be bought. He did not think any extension of the cultivation possible.

No experiment recorded.

CSL

AZIMGHUR.

This district lies north of Ghazeepore, stretching southwards from the Gogra, and is exclusively alluvial.

In 1848 the Collector stated that very little Cotton was produced in the district, and that little solely for local consumption; that it was sown along with other crops; that the soil was generally considered to be unsuited to the crop; that no increase in its cultivation could be expected; and that the imported Cotton cost 2·71*d.* per lb.

The Cotton Committee of the Agricultural Society, in January 1855, presented their report on four samples of Cotton submitted by Mr. Sturmer of Azimghur: "all these samples seem to have been "grown under circumstances uncongenial to them, and from some "cause they are remarkably weak."

The best of these was pronounced to be of inferior quality, short, hard, and weak.

GORUCKPORE.

This district lies between the Nipal Terai on the north, and the Gogra River on the south; it is of great natural fertility: its climate as well as its soils are by many supposed to render it specially adapted to the successful growing of Cotton, and it is described as including considerable areas of reclaimable waste land: and Mr. Collector Read stated, in 1843, that "the humidity of the atmosphere, the absence of hot winds, the abundant "and lasting dews, the rich vegetable mould, the undulating surface "of the country, and the invariably plenteous supply of rain," led him to believe that exotic Cotton would grow well there.

Mr. Blount, the American planter, also considered the district as generally well suited to the growth of the plant.

Goruckpore must present, moreover, many varieties of soil, for Mr. Blount incidentally speaks in the course of his correspondence, of "light sandy soils," "rich loams," and "stiff clays." The Commissioner also, in 1848, states that while Cotton is cultivated by the villagers in both the

CSL

eastern and western portion of this district, where the soil is well suited to the plant, none is ever grown by them in the central portion, where the reverse is supposed to be the case, and he regrets that it was precisely in this part of the district that Mr. Blount's experimental cultivation had been carried on. The following kinds of soil are known in the district :

Multea is a rich dark soil :

Bulloa is sandy :

Dorus is a mixture of the two former :

Bhat is like the last, but with kunkur added :

Bangur is stiff yellow clay, with sand.

The *Bhat* is the soil which retains moisture best, and is generally preferred for Cotton sowing : the other kinds being more porous, are apt to dry too completely for the welfare of the plant. The following varieties of Cotton are known and cultivated in Goruckpore :—

Kooktee, a species of Nankeen sown in February, after the ground has been slightly prepared for its reception : it is picked in the following September and October : it is an annual, and the same ground is never used for it in two consecutive seasons.

Murwa, if tended with care, is triennial, or even quinquennial : it is generally grown on narrow strips of ground round vegetable gardens, sugar fields, and such places : it grows both in the *Bangur* (or silicious soil) and in the *Bhat* (or calcareous soil), whereas the *Kooktee* will grow only in the latter.

There is also the *Dési* or universal indigenous variety, which is common to all the surrounding districts : it is sown in June on ground very slightly prepared for its reception, and does not yield until the following April. It is an annual, yields Cotton during four or six weeks only, and is then cut down.

In 1842 a sample was submitted to the Cotton Committee of the Agricultural Society, of Cotton grown in the year 1841 at Goruckpore, by Mr. Bridgeman, from seed of the Mexican kind.

CSL

The fibre was found shorter than that of the best specimen of this kind of Cotton, but it was very fine, delicate, and flexible, although rather too weak: the seeds also appeared somewhat smaller than was usual, but they seemed to be of healthy growth, and were very well covered with Cotton: the sample was pronounced to be a good one, and worth from 4¾*d.* to 5*d.* per lb., valued at the Liverpool rates of the spring of 1842, which were abnormally low.

Subsequently, some samples of Bourbon Cotton, grown in Goruckpore, were submitted to the Cotton Committee; these were found to be short and weak in staple, although soft and silky: and the Committee express their surprise that the soil or climate of Goruckpore, supposed to be so favorable for the growth of Cotton, should prove so apparently ill adapted to a variety so hardy as the Bourbon, and one which had prospered in so many parts of Hindustan.

In 1844 Mr. Blount attributes the failure of his experiment to the climate: he says that the fact of the soil he had employed being poor and sandy was not a disadvantage, for that his plants had grown well enough, and that on a portion of his ground where the soil was rich they had been just as much injured by the insects as elsewhere.*

In 1848 the Collector reported that there was not enough Cotton grown in Goruckpore for the supply of its wants: that about 3,627,000 lbs. were annually imported, of which 60,000 were re-exported to Nipal, besides considerable quantities of yarn and cloth manufactured in this district for that purpose.

The area under cultivation was stated to be about 1,300 acres, but there were thousands of acres which were supposed to be well suited to the crop.

The price of clean Cotton in Goruckpore is variously estimated: the Collector says " the average price in the principal marts is from

---

* Some farther particulars of Mr. Blount's experiment will be found in the second section of this work.

Rupees 12 to 13 per man of 60 lbs.," that is, 5*d.* per lb. (taking Rupees 12-8 as the average price). The Commissioner says the average price in Goruckpore is Rupees 12-8 per man of 98 lbs: that is, 3·06*d.* per lb. Mr. Secretary Muir, in the table in which he has collected all the information obtained in reply to the six questions of 1848, regarding the North-West Provinces, gives the price of Cotton in the Goruckpore marts at Rupees 12-8 per man of 80 lbs., or 3·75*d.* per lb.: and lastly, Mr. W. Cooke says that the price in the Goruckpore markets of the imported Cotton is about '3⅛ seer per Rupee,' which gives 3·84*d.* per lb.

Mr. Cooke states that the Cotton crop is sown sometimes in the same ground with Indian corn, urhur, &c., but often alone: that high lands are preferred, on which the rain water does not lie.

English yarn was imported to a considerable extent.

In July 1848 the Collector tried some of the Mexican Cotton seed obtained from the Coimbatore farm by the Agricultural Society: he sowed it in July in his garden: the plants grew well, and were large and strong: they also produced a large quantity of Cotton: Mr. Tucker distributed the seed from this crop to some cultivators in his district; but he expresses a doubt that it will flourish, except in gardens, and on choice soils: he forwarded a sample of the produce to the Society.

The Cotton Committee considered it a very fine specimen, fair staple, and worth 5¼*d.* per lb.

MIRZAPORE.

This district includes part of the flat country along the Ganges, some of the upland area formed by the north-eastern extension of the Bundelkhund plateau, and a portion of the valley of the Soane: none of it appears ever to have been a Cotton-growing country.

In 1848 the Collector reported that very little was then grown: that even this was sown in the same land with certain grain crops, and only to a small extent: but that formerly, under the stimulus of high

*

CSL

prices at one time prevailing, a few hundred bigas used to be cultivated near the Rewah frontiers: this may have been on the high ground of the plateau.

Mirzapore bazar is the great Cotton mart of Northern India: the wholesale price of Cotton was at that time:—

For the produce of Western Provinces.	
(Agra, Bundelkhund, and Furruckabad)	2·36*d.* per lb.
For that of the Southern Provinces.	
(Nagpore, Amraoti, and Sagur)	2·45*d.* per lb.
The Commissioner gives the average price	2·53*d.* „

and the average cost of transport from thence to Calcutta, by water, was 0·37*d.* per lb.

With regard to the extension of Cotton cultivation within the district, it was not thought that any could be effected.

BENARES.

The district of Benares is stated to be one of the richest agricultural countries in India; the soil is alluvial and very fertile: it includes many varieties, from stiff clays, to light sandy loam, each often containing kunkur: an excess of this ingredient is stated to injure the fertility of the land in some places: certain tracts are also rendered completely or partially barren by a too strong impregnation with nitrous substances: the climate has been described as transitional in its general character between that of the Lower, and that of the Upper Provinces.

In 1790 Mr. Duncan reported to Government on the Cotton cultivation of the district: there were then three kinds of Cotton commonly grown: the *Rarea*, the *Nurma*, and the *Munnoa:* of these the two former were about equal in value, and both considered much superior to the last.

The *Rarea* and *Nurma* together occupied on an average 20,000 bigas, yielding an annual crop of 15,000 mans of clean Cotton—of these kinds the clean was to the seed Cotton in the proportion of one to four.

The *Munnoa* was grown on the same ground with other crops, together with which it occupied 80,000 bigas, yielding annually an average crop of 8,750 mans of clean Cotton: of the gross weight of the raw produce only one-eighth of clean Cotton was obtained from this inferior kind.

The average price of the *Rarea* and *Nurma* Cotton was Rs. 12 per man (3·6*d.* per lb.), and the highest price reached for several years was Rs. 20 per man (6*d.* per lb.). The average price of the *Munnoa* was Rs. 10 per man (3*d.* per lb.), and the extreme rate Rs. 18 per man (4·5*d.* per lb.).

The *Nurma* is not, however, a regular crop: the plant stands for eight or ten years, and is cultivated only in gardens and near houses.

On the *Rarea* great care is bestowed, and its cultivation is profitable: a good rich soil is selected, which must be on high ground, and have command of a well for irrigation: the land is well prepared, and the seed sown in August: should long intervals occur between the falls of rain, constant attention has to be paid to the plants, and plentiful irrigation applied every fourth or fifth day: from the beginning of December this watering has to be again repeated, unless when showers obviate the necessity: great care is bestowed on the first picking, of which the fibre is most esteemed: this is kept separate, as a distinct quality: the picking goes on for a considerable length of time at short intervals, and care is taken to keep apart all soiled and damaged pods, which are set apart as third quality Cotton, along with any which may have fallen to the ground: it is found that the fibre obtained from such fallen pods cannot be separated from the impurities thus mixed with the wool, to the satisfaction of the spinners: the second quality is, however, perfectly pure: should much rain

CSL

fall during the Cotton harvest, an insect is found to attack the pods, and soil the wool of one division of each: wool thus soiled is, however, sometimes taken along with the second class Cotton.

The cost of production is thus stated:—

Rent of a biga of land	Rs.	5	0
Expenses of cultivation		4	2
		9	2
Average yield...		13	0
Net profits... ...		3	14

In the year 1788-89, only 40 mans of the Cotton grown in Benares were exported: the imports that year were 21·588 mans: of this quantity 21·550 were used in the district, and 38 mans re-exported. Of all the varieties sold in Benares, that known as Nagpore Cotton was most esteemed, and the first quality of the home grown crop was next, and very nearly equal to this: the Amraoti Cotton, although very good, came after these.

In 1848 the Collector reported that there were about 2,900 mans of Cotton annually grown in the district: the *Munnoa* and *Rarea* varieties were still known: the former was grown with other crops, on high, dry, sandy soils. The latter was cultivated only by those villagers who occupy themselves with garden cultivation, as it required irrigation: its yield was about double of that of the *Munnoa*, which is stated to vary from 40 to 80 lbs. per biga (64 to 128 lbs. per acre): there were supposed to be 1,881 acres annually under the *Munnoa*, and 85 under the *Rarea* Cotton: as to the extension of the crop, he thought that "if circumstances were to require it, there was "little doubt that a large portion of the soil of the district might "be made to bear Cotton."

The price of Cotton is stated to be about 3*d*. per lb., that of the imports being a little under the home-grown.

In 1848 some of the Coimbatore Mexican seed was tried in the public garden at Benares: the soil was a stiff clay, and the seed was sown in August: to the lateness of the season was attributed the fact that the plants were of a stunted growth, in spite of which they proved very prolific: the area was about half a biga, and in April 1849 104 lbs. had been picked (seed Cotton, it may be presumed) and the plants were still in full bearing.

Samples were submitted to the Cotton Committee of the Agricultural Society, who pronounced the staple to be short and weak, and valued the Cotton at 3¾*d.* per lb.

JOUNPORE.

The district of Jounpore lies along both banks of the Goomtee, north-west from the boundary of Benares; it is exclusively alluvial, and is stated to resemble Benares in all essential particulars. No special enquiry seems to have been made into its Cotton-growing capabilities, nor is there any experiment recorded as having been made on the possibility of growing exotic Cotton. In 1848 the Collector reported that there was not enough grown in his district for its local consumption: that being mixed with other crops, the area occupied could nót be calculated: that it was very carelessly cultivated and could not be easily extended: that the imported Cotton sold for about 3·15*d.* per lb., and was brought from Bundelkhund direct, some also coming through Mirzapore.

ALLAHABAD DIVISION.

Districts.
ALLAHABAD.
FUTTEHPORE.
CAWNPORE.
BANDA.
HUMMEERPORE.
CALPEE.

This division consists of two portions, in many ways dissimilar one from the other: namely, that lying in the Doab, that is, between the Ganges and the Jumna, and that lying south of the latter. The former portion of the division is made up of the districts of Allahabad and

CSL

Cawnpore: the latter of the districts of Banda, Hummeerpore, and Calpee. The country included in the former presents all the characters of the well-known and often-described tract, of which it forms a part: and the importance attached by all those who have spoken of its agricultural capabilities to wells and tanks for irrigation, attests the dryness of the climate as compared with the country below it to the east. With regard to the part lying south of the Jumna, it is described as including an area, irregular in breadth, of flat alluvial soil between the river banks, and the beginning of the rising grounds to the south: gentle undulations, sloping ground with a gravelly soil, and abrupt rocky hills, are spoken of as bounding the rich lands of the plain, and forming a transition between them and the hilly and elevated region known as the Bundelkhund table-land.

The soils of the southern portion of the division are described as differing from those of the Doab, even in the flat country along the right bank of the Jumna. The American Cotton planters all agreed in decidedly preferring those of the Bundelkhund side to those of the Doab, and to the last were unanimous in saying that they were admirably suited to the growth of the Cotton plant: they did not, however, leave any descriptions of those soils, and from their voluminous records, consisting of reports and correspondence, all I have been able to find on this subject is, that the soil of certain farms was considered much better than that of others, and that, generally, they found rich bottom lands subject to annual or occasional inundation, while others spoken of as light, red, sandy clay, bunjur, &c., were higher, and on these water never lay long.

The division commands one bank of the Ganges, and both banks of the Jumna for many miles, and thus possesses considerable advantages in the way of water-carriage, besides which, several confluents of the latter are navigable, some throughout the year, some during a portion of it: the Grand Trunk Road, and now the Railway, traverse it from east to west, and many good roads are said to exist.

ALLAHABAD.

This district, the most easterly of the division, includes, besides the lower end of the Doab, some of the country north of the Ganges, and also some on the south bank of the Jumna.

The whole is stated to be of great fertility: and to include many varieties of soil.

In 1831 Mr. W. Huggins* made an experiment with Upland Georgia seed at Allahabad. The result convinced him that this "description of Cotton may be very advantageously cultivated in "this country, as it requires no more labor than the common Cotton "of this country," while, at the same time, "the produce is much "more abundant than any of the native descriptions of Cotton which "I have seen in this country: the pods are more than double the "size, and the quality speaks for itself."

He sowed in May, and irrigated until the rains commenced, at which time he removed all the young plants into beds (prepared for them by thoroughly ploughing the ground), where he set them in rows five feet apart: he thought, however, that the best way would be to sow at this time, and thus escape the cost and trouble of culture during the dry month or two previous.

From the time he transplanted his crop, he bestowed on it no more care than is ordinarily given to the common Cotton crop of the district: he thought the best soil would be a light one, a mixture of sand and clay: and he considers that transplanting is a serious disadvantage: his plants, nevertheless, grew vigorously during the rains, and the pods began to open early in October: pruning (topping), he believes, might sometimes be resorted to with advantage, as it certainly strengthens the plant, but it would make it later in bearing. He cleaned his Cotton with the native churka.

---

* Agricultural Transactions, Vol. II., page 122.

In 1837 Mr. Lambert made an experiment at Allahabad, with various exotic seeds, namely,

Peruvian,
Upland Georgia,
Sea Island,
And New Orleans.

The soil he used was a "red clay, mixed with kunkur," and he sowed on the 29th July.

The Peruvian seed did not germinate.

The Upland Georgia grew well: the plants flourished, and when about three feet high, blossomed, and the Cotton was ripe in December: in January the plants suffered severely from frost: the greater part of them, however, survived, and had completely recovered their vigour by April 1838.

The Cotton Committee pronounced the sample to be a good fair specimen of its kind.

The Sea Island seed produced plants, but they were all destroyed by the frost before any of the Cotton could be picked.

Mr. Lambert, however, forwarded samples of this kind of Cotton, which he had grown from the same batch of seed, in the same kind of ground, during the previous season: it had been sown in December 1836, and picked in November 1837.

The Committee thought this sample showed considerable degeneracy.

The New Orleans seed also came up, but the plants were of stunted growth, and had at no time a healthy appearance: in January they were almost totally destroyed by the frost, before the Cotton was ripe.

The Committee do not take any notice of the sample, save to remark that it was far inferior to that of the Upland Georgia.

GSL

They add that the experiment establishes the character of the former as a hardy plant, which may do well in India.

In 1842 the Secretary* of the Allahabad Agricultural Society forwarded to the Agricultural Society of India seven samples of Cotton, all (save one) of exotic kinds, grown in the district, and presented as candidates for a prize which the Society had offered. They had all been grown on the method of the American planters, save that some of them had not been "earthed up" when the plants were young: it is also stated that the season had been unusually unfavorable, so that the samples generally were below the average of what might be reasonably expected: the specimens were as follows: one of *twin-bolled* Cotton, one of *Nagpore* Cotton, and five of the *Mexican* kind.

The twin-bolled Cotton was considered by the Cotton Committee a very fine specimen: the abundance of the fibre attached to each seed showed that the plant was not only a prolific bearer, but that it had thriven: it belongs to a short-stapled variety, but as a specimen of that kind, was of fair length, strength, and fineness: the seed was, however, tenaciously adhesive to the fibre: cleaned, it would be worth 5*d.* per lb.

The Nagpore sample was also a good specimen of an indigenous Cotton: superior to the common kinds, short-stapled, but strong, fine, and flexible: seed very adhesive: cleaned it would be worth 3½*d.* per lb.

The samples of Mexican Cotton were some better than others; their values ranging from 5¼*d.* for the best, to 4⅜*d* per lb. for the worst; the proportion of fibre to seed was less than in the case of the twin-bolled Cotton, but the length, strength, and fineness of the staple were superior: the whole were thought excellent in these respects, and good specimens of the short-stapled variety to which they belonged. In the same year Mr. Commissioner Lowther submitted† to the Society samples of

---

* Agricultural Journal, Vol. I., page 25.

† Agricultural Journal, Vol. I., page 27.

Mexican Cotton grown in his garden. Some was sent in the raw state, some had been cleaned at Allahabad in a Sheffield saw-gin; some he had cleaned by the native churka and bow, and some had been cleaned under the superintendence of Mr. Finnie, the American planter, in a saw-gin set up at the Kotra experimental farm.

The Cotton Committee thought the raw Cotton a good specimen of its kind, of fair length, strength, and fineness of staple, and if well cleaned, worth *5d.* to *5¼d.* per lb.

The sample ginned at Allahabad had been much injured in the process, and was not worth more than *4d.* per lb.

What Mr. Finnie had ginned was less injured, and worth *4½d.* per lb.

That cleaned in the native manner was much better than either, considerably less injured in the process, and worth *4¾d.* to *5d.* per lb.

In 1848 the Collector reported that there was very little Cotton grown in his district, and certainly not more than it consumed, so that no export trade could be said to exist: in the pergunnahs lying south of the Jumna, the soil is stated to be well suited to Cotton, and some is occasionally grown there, but is considered an uncertain crop: two kinds are known, the *Rarea* and the *Munnoa:* the latter is cultivated without much trouble or care, and is the commoner kind; the former, although its produce is much larger in quantity, and better in quality, is not thought remunerative on account of the expense and trouble which its cultivation necessitates.

The average price is stated to be *2·52d.* per lb., and there were supposed to be 27,689 acres under the crop, and 29,881 acres more could be brought under that kind of cultivation in this district.

In 1848 Mr. Lowther tried at Allahabad the Coimbatore Mexican seed: he sowed it in his garden in June, and the plants came up well: they grew nearly six feet high, and were strong and healthy: the season was one of very unusual heat, but with the aid of irrigation

CSL

the plants seemed indifferent to this: the pods were ripe in September, and yielded a good crop: about the middle of the following April a second crop began to be picked: this continued up to the middle of June, and at the end of that month some young blossoms had begun to appear, and pods were forming again.

Mr. Lowther also gave some seed to a landholder in the district,* who planted it on good Cotton soil: owing, however, to the drought of the season, and not having the advantage of irrigation, this totally failed; some of this seed, sown by the villagers, to whom Mr. Lowther had distributed a portion of it, although also injured by the drought, and not irrigated, had a partial success.

Mr. Lowther, in forwarding samples of all these Cottons to the Agricultural Society, expressed his opinion that the "Mexican Cotton "could not be cultivated in Bundelkhund with any prospect of success, "as the seasons are not to be depended on; but in any part of the "country where irrigation is available, it might be turned to good "account, even in seasons of drought:" that raised in his garden had been irrigated from a well, whenever desirable.

The Cotton Committee reported on the samples in September 1850.†

The sample of the first crop from Mr. Lowther's garden was considered a good, strong, well-colored Cotton, with a fair proportion of fibre to seed, valued at 4½*d.* per lb.

The sample of the second crop was thought not quite so strong, nor quite so clean, worth 4¼*d.* per lb.

The sample of the first crop of the village-grown Cotton was thought not so well colored as the first crop from the garden, but of fair staple: it was worth 4¼*d.* per lb.

---

* From the fact that Mr. Lowther mentions Bundelkhund in another part of his letters, it seems probable that this seed was sown in that part of the Allahabad district, which lies south of the Jumna.

† Agricultural Journal, Vol. VII., page 198.

CSL

The sample of the second crop of the village-grown Cotton, closely resembled, and was fully equal to, that of the first crop of the garden Cotton, and was valued at 4½*d.* per lb.

This last sample was forwarded (along with some others from various parts of India) to England, and, in June 1851, reported on by Messrs. J. Cook and Co., London brokers.*

It was pronounced to have a fine long staple, and to be, if carefully cleaned, worth 5½*d.* per lb.

FUTTEHPORE.

The Futtehpore district lies in the Doab, west of Allahabad.

In 1848 the Collector stated that there were 29,745 acres under Cotton in his district, and that an increased demand might bring 20,000 more into cultivation: that the average yield of clean Cotton per acre was from 90 to 118 lbs., and that the average price was 2·9*d.* per lb.†

The export trade was inconsiderable.

CAWNPORE.

The Cawnpore district is next above Futtehpore in the Doab; it, as well as Futtehpore, is spoken of as extremely fertile, but, like it, often suffers from drought.

In 1848 the Collector reported that there were supposed to be about 101,111 acres under the crop, and he thought that area could be doubled were there any encouragement to the extension of the cultivation.

The average rate of yield per acre is given at 194 lbs., and the market price is stated to be 2·23*d.* per lb.

Mr. Deputy Collector Bruce states that the cultivator, when he can keep clear of advances, sells his clean Cotton at six Rupees per man of 96 lbs., or 1·5*d.* per lb., and that the dealer generally sells at seven Rupees per man of 80 lbs., or 2·1*d.* per lb.; he says that, when the

---

* Agricultural Journal, Vol. VIII., page 23.

† The corresponding price in Mr. Muir's table is 2·42*d.* per lb., the difference being probably that at which the dealer buys and sells.

GL

cultivation is well attended to, 211 lbs. of clean Cotton can be obtained per acre.

In 1849 Mr. Bruce tried some of the Coimbatore Mexican seed. The seed was sown in July on a biga of land in Mr. Bruce's compound: the ground was well manured, ploughed, and carefully weeded: the seed throve, and the plants grew well: each one yielded from 50 to 60 bolls as a first crop, during the autumn, and about half as much more as a second crop, during the spring of the following year: in the month of January heavy rain, and a subsequent frost, injured the pods then on the plants, and also the plants themselves: notwithstanding which he had gathered six mans of seed Cotton, of which two mans will be clean Cotton, or 160 lbs. from about half an acre. Mr. H. Bell, of Agra, in writing on the subject of this experiment, speaks of the out-turn as 182 lbs. per acre: he greatly praises the quality of the samples of it, which had been sent to him.

Samples ultimately reached the Agricultural Society's Cotton Committee: they considered them beautiful specimens of the kind of Cotton, the bolls were large and full, and the cleaned Cotton of good color and fine staple, and worth 5½*d.* per lb. When these samples were, in June 1851, examined by Messrs. J. Cook and Co., of Mincing-lane, they were described as of "bright color, good stout staple, and very "clean, worth 6¾*d.* to 7*d.* per lb., and better than fair Orleans."

BANDA.

This district lies south of the Jumna, and is a part of Bundelkhund: although the northern portion of it, near the river, closely resembles in its physical aspect, the flat country of the Doab, the soils are even there described as different in their nature: farther south they present many varieties, as the ground rises towards the hilly country in that direction: the plain, as well as much of the upland part of the country, is stated to be of great fertility, and the district has been long famous for its Cotton.

CSL

In 1848, the Collector reported that 102,852 acres were supposed to be under the crop; he adds, "I believe that all the land in the district, "except that which is periodically overflowed, and constitutes a very "small portion, is capable of growing Cotton; and that about one-"third of that might be actually cultivated in any given year, the "other two-thirds lying fallow, or undergoing the usual rotation of "crops."

It was customary to sow the Cotton seed along with several other kinds of crops: at the same time considerable care is bestowed on the Cotton; it is weeded and hoed, but the picking is always slovenly, much of the Cotton is allowed to fall on the ground, and all of it is allowed to get mixed up with leaves and dirt: in order to ensure as large a quantity as he can, the cultivator exerts himself to encourage the productiveness of the plant, but he is indifferent to the quality of the produce.

In 1848 the Collector of Banda tried the Coimbatore Mexican seed: in the first week of July he sowed about 1 lb. of the seed on 0·4 of an acre of ground in his compound. The soil was of the kind known as *Purwa,* esteemed of third-rate fertility*; the crop was irrigated, but in all other respects treated as the common country Cotton. The seed all germinated, the plants grew well, and began to bear at the end of October: they were still bearing in April 1849, and looked healthy and strong. The total yield was 87 lbs., of which 27 was clean Cotton, that is, at the rate of 66 lbs. per acre, the clean Cotton being 31 per cent. of the raw produce.

The exotic plants outlived the cold season, and continued bearing through most of it, whereas all the native Cotton crop was killed by the frost.

Mr. Edgeworth considered that his experiment proves this kind of Cotton to be hardy, prolific, and suited to that part of Bundelkhund.

---

* Elsewhere described as a "reddish, tenacious clay, sometimes mixed with sand."

CSL

He had sent some of the seed to two different parts of the country for trial: in one of these the crop, when in a most flourishing condition, was maliciously destroyed: in the other, it had been blighted by drought.

The Banda Cotton dealers, to whom he submitted samples of his own Cotton, pronounced it to be of very good quality, and that if it could be largely grown in the district, it would command a high price in the market.

The samples which were sent to the Agricultural Society* were pronounced by the Cotton Committee to be of excellent quality, tolerably clean, good fair length of staple, similar to "good fair to good middling" New Orleans Cotton in color and quality, worth 5¼*d.* per lb.

In June 1851 Messrs. J. Cook and Co. report on the sample: "This kind of Cotton might answer the purpose of good Bengal: the "staple, degenerated from the original stock, has become short and "uneven, and there is a little stain and seed"—valued at 4½*d.* per lb. In May 1860 the Government sent to the Revenue Board of the North-West Provinces a barrel of New Orleans Cotton seed, which was forwarded to the Collector of Banda for distribution among the land-holders of his district, and for experiment in the public garden of the station: any of it that he could not advantageously distribute was to be forwarded to Humeerpore for trial there.

In July 1861 the Collector of Banda reported that the whole of the seed sent had failed to germinate. It had arrived too late to be sown in 1860, and was kept until the season of 1861, but had lost its vigor in the interim, notwithstanding that it had been put away in a dry place. The Collector had sowed some of the seeds in his own, and in the public gardens, where about 10 per cent. of the seeds had come up. He attributes the failure of the seed to its having been kept a year, as some seed of the same kind, which he had himself obtained from

---

* Agricultural Journal, Vol. VII., page 198.

Calcutta, direct, and which he sowed in his own, and in the public garden, as he had done the other, was all growing well.

HUMEERPORE AND CALPEE.

The country included in these districts is situated to the west of Banda, and lies south of the Jumna, and between the river and the Gwalior, Jhansi, Dattia and Terhee Territories of Bundelkhund: it physically resembles the Banda district, and like it, has long been a well-known Cotton exporting country.

When this part of British India was ceded to the East India Company, the principal advantage anticipated from the acquisition, was that the Cotton then needed for the manufactures of Bengal, might be grown within British Territories, and no longer imported from countries beyond the control of government, and reports were ordered to be sent in by officers, who first undertook the management of the newly acquired districts, on the possibility of so stimulating the production of Cotton there, as to render the spinners of Benares and Dacca independent of those farther supplies which they had hitherto drawn from the Deccan, by way of Mirzapore. I have not been able to find any of the reports sent in, nor any record of measures recommended, or adopted, to attain the object proposed.

In 1836, Mr. Bruce, of Calpee, furnished the Agricultural Society with a memo. on the cultivation of Cotton in this part of Bundelkhund.*

He describes five varieties of soils :—

1*st*. The *mar*, or *maura*, a " black marl of the first quality," the most productive soil in the country.

2*nd*. The *kabur*, a " black marl of the second quality, elsewhere spoken of as the *mar*, plus a slight admixture of sand.

3*rd*. The *teer* lands on the banks of the river (Jumna) or streams, and subject to annual flooding.

---

* Agricultural Transactions, Vol. III., page 175.

4th. *Purwa* (or sometimes written pundhoah), a "mixture of sand and clay, described by Mr. T. J. Turner as "of a reddish color, and tenacious clayey soil."

5th. *Runkur*, a "mixture of lime, stones and clay," described by Mr. Turner as a light-colored "sandy soil, abounding with small kunkur stones."

The first two are peculiar to Bundelkhund and Malwa,* and produce the most luxuriant crops of Cotton, as well as of grain, when the rains are moderate. The third is exclusively used for winter crops (rubbee). The fourth, "accordingly as it is rich or poor," is either sown with khurreef (rainy season crops) or rubbee. The fifth, which is found in ravines and broken ground, where the water runs off as fast as it falls, is considered too poor for any, save the rainy season crop: it is thus used for Cotton, and in a season when there is an amount of rain sufficient to prove injurious to Cotton, which has been sown in the richest kind of soil, that growing on the runkur thrives.

He states that the average rent of land of these different kinds was then as follows:—

Mar	Rs.	1 13	to	2 8	per biga.
Kabur.........	,,	1 8	,,	2 0	,,
Teer	,,	2 0	,,	5 0	,,
Purwa.........	,,	1 2	,,	2 8	,,
Runkur	,,	1 0	,,	1 8	,,

Cotton is always sown at the beginning of the rains; if the season is favorable, picking commences about the middle of September on the poorer soils, but on the *mar* and *kabur* not until the end of October: he mentions some varieties of Banda Cotton, which take still longer in coming to maturity.

---

* As far as verbal description warrants a supposition of identity, such soils may be found in the Nerbudda Valley and in Nagpore.

CSL

There are great differences in the yield per biga, between the better and inferior kind of soil; and the same soil under more or less careful culture yields a better or a worse crop.

Average of clean Cotton :—*mar*, 1½ man per biga, or 286 lbs. per acre, taking the man at 80 lbs., one-third being the proportion of the clean Cotton in the raw produce.

Purwa, 40 seers per biga, that is, 191 lbs. per acre, two-sevenths being the proportion of clean in the seed Cotton.

Runkur, 30 seers per biga, or 143 lbs.* per acre, one-fifth of the produce being weight of clean Cotton.

The Cotton is never sown alone, so that the cost of cultivation is not capable of accurate determination: it is, however, considered that two ploughings and three weedings are necessary for the Cotton: the cost of this is estimated at Rs. 1-4 per biga: when paid labor is necessary in picking, one-twentieth of the produce is allowed for remuneration.

Generally speaking, the poorer villagers of this part of Bundelkhund, have, as a rule, to seek the money-lender before the crop is gathered: they mortgage the produce: the value of the seed being in excess of the cost of separating it from the fibre, the usurer always claims the seed Cotton: besides which disadvantage, the grower has this other, namely, that the value of his crop taken in liquidation of his debt, is regulated at the market rates of the time when it comes to be sold, which rates are under the control of the class from whom he had borrowed. Cotton, which the villager has been able to keep and clean himself, is much better prepared for the market than the other—much cleaner, and, in the village markets, fetches eight annas per man more: when among the villagers paid labor is had recourse to in

---

* In every case the amount of yield per acre is very high, and there may probably be some error in the size of the biga mentioned: Mr. Bruce, however, distinctly says it is 18,225 square feet.

CSL

cleaning the Cotton, the seed itself is given as remuneration, but the traders prefer paying a Rupee per man of clean Cotton turned out, and retaining the seed.*

Ground from which a winter crop has been taken is preferred for Cotton: ground which has been fallow, is twice ploughed as a preparation for the seed, which is rubbed with moist cow-dung, to serve as a manure, and sown broad-cast; the plough is then once passed over it: in five days the plants ought to be visible: they require a first weeding in ten or fifteen days after this, a second in a month after that again, and a third fifteen or twenty days later: if the plants have sprung up too thickly, they are thinned out, until they stand at least a foot apart every way: in the black soils the plants grow to about four feet, in the other kinds to about two feet high; they blossom early in August, but seldom form their pods before the commencement of September.

The only difficulty, according to Mr. Bruce, in the way of introducing better methods, would be the cost: many causes seem to have combined to deter the villager from attempting any amendment, one is mentioned:—one of the better class of cultivators may have carefully tended his crop, which may be supposed just coming to maturity, and likely, by its abundance and good quality, to reward him for the pains and expense he has bestowed: from whatever cause, his landlord is unable to meet the demand of Government for rent: the ground is put under restraint, and the villager not allowed to touch a pod until the demand be met, or security found; meanwhile he has had leisure to watch his Cotton fall on the ground, and get soiled by showers, and to resolve never again to throw away his time and money on careful cultivation.

---

* With regard to this cost of cleaning, it is stated in a letter of the Bombay Government, 1790, to have been there, at that time, "one Rupee per five or six mans" of raw produce of course, and the seed to be worth two rupees eight annas per man: the value of the labor may be nearly equal to that mentioned in the text, but the value of the seed is materially greater.

"The ryots, I have had ample opportunity of knowing, could not "pay more attention to their Cotton cultivation were they placed "under European superintendence than what they are ready to "bestow upon it now." The bettering of their general condition, and the removal of such hindrances to improvement as the above, is alone required.

At the time he wrote (June 1836,) land in that part of Bundelkhund was at a discount: villages might be had in farm at a very cheap rate, and he thinks that both villagers and land-owners would willingly contract for the cultivation of Cotton at fixed rates per biga, or would engage to deliver the produce (raised in their own way) at fixed rates per man: he prefers the latter plan. He believes that cultivation by paid labor, although more expensive, would secure the best kind of produce, but would not prove remunerative.

The contracts alluded to specify all particulars of cultivation, as the numbers of ploughings, weedings, &c.; he appends some calculations to show the cost of producing a man of Cotton on this system.

Rent per biga :—

Average of mar land	Rs.	2	2	0			
" of kabur	"	1	12	0			
" of purwa	"	1	13	0			
" of runkur	"	1	4	0			
General average					Rs.	1	11	10½
General average contract rate for cultivation per biga					"	2	0	10
Seed per biga					"	0	0	10
Gross outlay per biga					Rs.	3	13	2½

Return per biga from				
Mar land (4 mans of raw produce), of which one-third clean Cotton	Mans	1	20	0
Purwa or kabur	"	1	0	0
Runkur	"	0	30	0
One-twentieth deducted as cost of picking, and seed covering expense of cleaning				
General average produce per biga	Mans	1	1	2⅔

CSL

Using the values already assigned to the weights and measures employed, the above figures give

Total cost of cultivation, per acre Rs. 9, (or accurately Rs. 8 15 9)

Produce in clean Cotton per acre ... ... 197 lbs.

which gives the cost of production as 1·09*d.* per lb. Under the neej system (that is, by paid labor), this cost would be much greater, and all risk would fall on the speculator, whereas at least part is, on the contract system, undertaken by the cultivator. Mr. Bruce used to contract with the villagers on the security of the landholders at the rate of Rs. 8 per man (2·40*d.* per lb.), for first class Cotton: he always insisted on the best out-turn of the first pickings: including all casual losses, all charges for establishment, &c., this Cotton used to cost him Rs. 10 per man (3*d* per lb.), and he could always sell it at Rs. 12 (or 3·6*d.* per lb.)

It was in this part of Bundelkhund that the four American planters, who were allotted to Bengal, passed their first season: a sketch of their proceedings will be given hereafter: their experiment ended in failure: but they unanimously attributed this to the vicissitudes of climate, which they had not been led to expect, and which, they asserted, were such as to render the cultivation of the American varieties of Cotton impossible in the country: a careful consideration of their proceedings, and the results which attended them, will, I believe, tend to impress on the mind a conviction, that there is at least *some* reason to suppose that the conclusion at which they arrived is not warranted by the premises their experience furnished: that their failure *may* be due rather to the fact that their methods of culture ought not reasonably to have been expected to ensure success, when applied to conditions of soil, climate, &c., so essentially different from those prevailing in the country, to meet the peculiarities of which, those methods had been originally contrived and developed: that, in short, the possibility of cultivating the American varieties of the Cotton plant in this part of

CSL

Bundelkhund, is nearly as much an open question as if the four planters had never crossed the Jumna.

In 1848 the revenue officers reported that there were 87,890 acres under Cotton in Calpee and Humeerpore at that time, and that this area could be easily doubled were a demand for the produce to arise: the general average yield was stated as 109 lbs. per acre, and the average price throughout the two districts as 2·12*d.* per lb.: the average proportion of clean Cotton was supposed to be more than one-fourth, and less than one-third, by weight, of the raw produce.

It was stated that much of the Cotton which is exported from the district is not grown there, but is sent from the country to the south for the benefit of water-carriage here available.

AGRA DIVISION.

Districts.
ETAWAH.
FURRUKABAD.
MYNPOORIE.
MUTTRA.
AGRA.

The districts of the Agra division, like those of the Allahabad division, lie for the most part in the Doab, but partly also south of the Jumna; only a small area of Bundelkhund is, however, included. The country met with in passing up the Doab towards the north-west, is described as becoming gradually more and more arid, and subject to drought: no decrease in its natural fertility appears, however, to obtain, for its wonderful powers of production under the influence of irrigation have been often praised.

In 1848 the Commissioner reported that there were then supposed to be about 283,156 acres of land within his division, annually, under the Cotton crop: he thought, too, that this area might be greatly extended, were a demand for the produce to arise.

ETAWAH.

The Etawah district lies between Cawnpore and Agra, extending along both banks of the Jumna; it includes part of the Doab, and a smaller area in Bundelkhund also.

The district has been always known in connection with Cotton, and a Commercial Resident in former days used annually to collect large quantities on account of Government, which were sent down to the south-east for Benares, Dacca, and other places in Bengal.

In 1848 the Collector reported that there were 49,676 acres under Cotton, which might be increased to 60,946 acres, by an increased demand: the average bazar rate for clean Cotton was 2·06*d.* per lb., average produce being 132 lbs. per acre.

FURRUKABAD.

This district lies in the Doab north of Etawah, and stretches along the right bank of the Ganges.

In 1848 the Collector reported that 14,148 acres of land were under Cotton that year; that his subordinates had estimated the area capable of being added to this as 7,008 acres more; but that he believed an increased demand might spread the crop over a much greater area, as "any land that lies high, and is irrigable, may be made to produce "Cotton by labor and manure."

The average bazar rate for clean Cotton was 3*d.* per lb., and average produce per acre 192 lbs. of clean Cotton.

MYNPOORIE.

This district lies also in the Doab, north of Agra. Mr. Finnie, who passed through it during his cold-season tour of inspection (1842-43), expressed himself most unfavorably of the country: it looked, he said, "like "an ash bank, and the soil was a mixture of sand and poor white clay."

In 1848 the Collector stated that there had been 29,290 acres under Cotton that year, and that a very considerable extension was possible: the produce per acre was about 170 lbs., and the average price 2·3*d.* per lb.

MUTTRA.

Muttra district includes part of the country north of the Jumna, and part of that to the south, extending to the frontier of the Bhurtpore territory: except

CSL

in this, its southern portion, the district is flat, and resembles the country to the east, already briefly described: the hot winds, however, are stronger here, and the ground still more arid: the soils of that part of the district which lies west of the Jumna are described as very sandy and calcareous: they bear, however, fine wheat crops: the well water is sometimes brackish, and the soil in places contains saline matter: Mr. Finnie thought the Cotton grown in this district superior in staple to the produce of Agra, and he attributed its better quality to the presence in the soil of this saline impregnation.

In 1848 the Collector stated that the arable land of the district was estimated at 761,277 acres, of which 103,042 acres were under the Cotton crop, and that he thought one-third of the whole area available for cultivation, might be made in any one year produce Cotton, which would considerably more than double its then extent. The average produce per acre was 176 lbs., and the bazar rate 2*d.* per lb. (both for clean Cotton.)

AGRA.

The Agra district lies south-east of Muttra: it includes part of the Doab, and also a considerable area south of the Jumna: in physical character the country resembles Muttra; its soil is arid and sandy, but under irrigation produces largely.

In 1842 Mr. H. H. Bell sent a trustworthy man to Chanderi,* and obtained samples (in seed) of the choicest of the *Munnoa* and Berar varieties of Cotton there used: he ordered that the different kinds should be carefully kept distinct from each other, and he subsequently had the seed separated under his own inspection. This seed he had sown in some of his villages near Agra, but the drought destroyed the whole crop, save only in one field near his own house: this, however, also suffered, and was besides injured by white-ants to

---

* Agricultural Journal, Vol. II., page 62.

CSL

such an extent that the whole of the plants which came to maturity on an area of five bigas, which had been originally sown, might have stood on one biga. No estimate of produce to area can therefore be given. The plants which survived grew very luxuriantly, stood from six to seven feet high, and were remarkably prolific: he mentions one plant, which, after having been several times picked at intervals, actually at one time carried 187 pods: these were not large, and might have been the better for thinning, and the proportion of clean to raw Cotton is also smaller than in the common Cotton of the district.

He believes that the best way of cultivating these plants, in this district, would have been to plant a month before the beginning of the rains, and irrigate as long as there was any necessity.

He was surprised to find that his field contained at least three different varieties of the Cotton plant, distinguishable by the form of the leaf, of the flower, and of the plant itself; in the quality of the Cotton yielded by these three kinds, he could not perceive any difference, nor could Mr. Finnie, to whom he submitted samples: it was undoubtedly superior to all ordinary indigenous Cotton.

As to this mixing of different kinds of Cotton, Colonel Sleeman suggests in explanation, that the different varieties of choice Cotton employed at Chanderi, although scrupulously kept separate and distinct in cultivation, are all raised in one locality, and by the people of a few contiguous villages: Mr. Bruce, on the other hand, believed that the true explanation was to be found in the fact that the fine Cotton taken to Chanderi consisted of carefully selected samples from many and distant parts of the country, the finest pods being picked out in each case.

In the Secundra gardens at Agra some exotic seeds were subsequently tried: they were of the following kinds: *Egyptian*, *Maltese*, *Seychelles*, and *Chinese Nankeen*. Samples were sent to the Agricultural Society, and the Cotton Committee considered all very

GSL

bad, save the Egyytian, which was, however, thought to show degeneracy, and the Seychelles, which was considered a fair specimen of a kind of Cotton readily saleable in the European market.

In 1848 the Collector reported that there were 87,000 acres then under the crop, which an increased demand for the produce would extend to 33,000 more: the average produce per acre was 112 lbs., and the average price 2·2*d.* per lb. (both for clean Cotton.)

ROHILKUND DIVISON.

Districts.
SHAJEHANPORE.
BUDAON.
BAREILLY.
MOORADABAD.
BIJNOUR.

The tract of country included in this division, extends from where the Ganges makes its exit from the hills, to the frontier of Oude on the west; it is bounded by the great river on the south, and on the north by the hill districts of Kumaon; and thus lies between the mountains and the arid flat of the Doab: it is described as resembling the Doab in all its principal physical characters, at least along its southern portion, whereas, near the hills, some modifying causes are stated to influence both the climate and the condition of the soil.

In 1848 the Commissioner reported that the general average price of clean Cotton for the whole division might be taken at 2*d.* per lb., the cultivator selling a little cheaper: he thought that the cost of packing, carriage, &c., included, it could not be laid down in Calcutta under 3*d.* per lb., but that, as matter of fact, it never was sent there.

He believed that there was no prospect of any material reduction being effected in the cost of production: that, on the contrary, an increase in the quantity then exported would be necessarily attended by an increase of price, as would, of course, any amelioration of the quality of the produce, either from better cultivation, or more careful picking, &c. This high cost of production he attributes to the high rent paid for good land. Assuming the average yield to be 162 lbs., and the price 2*d.* per lb., one-half of this goes for rent; this is not, he states, because the Government demand on the land is exorbitant, but simply owing to the agricultural value of the soil: were no Government assessment levied, he believes the cultivator would not hold his field for less than he now pays. The soil seemed to him well adapted to the plant, which grows vigorously, and is prolific: a price of 3*d.* per lb. would very greatly extend the crop.

He did not think that the quantity raised in the division greatly exceeded its local consumption: for although much was exported, considerable imports also took place from the south.

Rohilkund Cotton is of inferior quality, short-stapled, and dirty; it is quite unfit for the English market. The inherent bad qualities he attributes to the fact that the same seed has been sown from time immemorial on the same soil, and always carelessly cultivated: it is sown broad cast, very rarely manured, and never irrigated: the plants under this treatment come up irregularly, patches in each field are bare, whilst in other places the plants are allowed to stand crowded together in a way which stunts their growth, and diminishes their productiveness: other crops, too, are often sowed in the same land along with the Cotton.

Besides the evils which such a system, pursued for generations, entails on the quality of the Cotton, its length, strength, and color of fibre, &c., there are other disadvantages which result from the impurities always found along with it, and these are attributable to carelessness in gathering the crop: the pods are allowed to fall on the ground and lie there; they are attacked by insects, soiled by rain, and swept up always with dry leaves, broken twigs, and other extraneous matter, which no process of cleaning can ever separate from the fibre of the Cotton.

CSL

The Commissioner thinks that a more careful system of culture, and a better manner of picking the produce, would not be difficult of introduction, and that if the natives found these to their advantage in securing a higher price, they would be readily acted on.

SHAJEHANPORE.

This district extends along the west frontier of Oude, from the Gogra, near where it leaves the hills, to the Ganges.

In 1848 the Collector reported that there were about 7,160 acres then under the crop, and that 4,573 acres more were available. No Cotton was supposed to be exported, and the average price was 2·35*d.* per lb.

There were supposed to be considerable tracts of land well suited to Cotton cultivation in the northern portion of the district, near the foot of the hills.

In 1860 Mr. Rowell tried New Orleans and Egyptian seed in Shajehanpore. The Cotton Committee pronounced both to be good fair specimens of their kind, although not first-rate.

BUDAON.

The Budaon district lies along the left bank of the Ganges, west from Shajehanpore, and also includes a long narrow strip of country along the right bank and in the Doab.

In 1848 the Collector reported that there were 34,091 acres under the Cotton crop, which might be extended to 79,489 acres. The average produce was 160 lbs. per acre, and the average price was 2·4*d.* per lb.

BAREILLY.

This district lies north of Budaon, and, including Phillibeet, extends to the foot of the hills west of the Gogra River.

" The general impression in this district appears to be that the " Cotton thrives best on a high table land, and requires a soil " neither too dry nor too humid: that manure of cattle dung is essen- " tial to the rapid development of the stems and branches, and that

GSL

"accordingly fields in the immediate vicinity of a village, where "cattle are principally collected, night and morning, are the best: "such fields are ploughed five times before receiving the seed: the "crop is twice weeded before picking commences."

Mr. Finnie, in a tour which he made through this part of the country, saw a good deal of this, and the neighboring districts. Speaking of the northern portion of Rohilkund, he "unhesitatingly "asserts the country generally to possess the best natural resources of "any district he had seen" : the best land is unhealthy to live on : he recommends clearing the Terai, draining it, and drawing off the water from thence to irrigate the country beyond : although the soil of Bareilly was poor and sandy, its productive powers under irrigation greatly surprised him. "All India must be the garden of the world if it was supplied with water."

He closely examined the soils in a few places, and speaks of eighteen inches of a sandy lead colored clay, under which he found a sub-soil, consisting of a coarse brown sand. "I should not," he says, "consider this a particularly good soil, or foundation for a soil, but when watered, its productive powers are immense."

He did not consider the country about Phillibeet well suited to Cotton, save parts of the higher grounds, which, after irrigation, would let the water run off readily : in the northern part of the Bareilly district he speaks of the land as "most beautiful, as good as I ever wish to see, but the unhealthiness of the climate renders it useless." In the north part of Phillibeet, too, he was greatly pleased with the soils : he notices a fine deep vegetable mould passing down into sand, the "finest land in the world."

In 1848 the Collector reported that Cotton was not much cultivated in his district, not sufficient for its local consumption, and that the soil and climate did not appear to be suited to the plant. The produce per acre was 105 lbs., and the price 2*d.* per lb. ; the profit derivable

CSL

from the cultivation was small, the area under the crop was at 9,711 acres : he did not think any extension likely.

MOORADABAD.

The Mooradabad district lies west of Bareilly, and stretches from the foot of the hills to the Ganges.

In 1848 the Collector reported that there were 50,000 acres under Cotton cultivation in his district: that an increase in price would cause a very great extension of the area now under the crop: the average produce of clean Cotton per acre is stated to be 240 lbs., and the price 2·5*d.* per lb. The Cotton of Mooradabad has a reputation for being superior to that of the Doab, cleaner and better picked ; its staple is, however, very short, and apparently bad.

BIJNOUR.

The Bijnour district forms the extreme north-west end of Rohilkund.

In 1848 the Collector reported that there was abundance of land in his district well suited to the growth of Cotton, butt hat the system of tenures there prevalent acted as a check on the extension of the cultivation: the rent paid varied with the crop which might be sown, and was very high for Cotton: the villager thus does not find it profitable to grow Cotton save on the very best lands ; "he is in "some places obliged by custom to sow a certain quantity, but he re"luctantly exceeds the prescribed amount." The success of the Cotton crop depends, moreover, on its being well weeded and looked after in the early part of the season, and just at this time the sugar crop exacts similar attention, as well as the rice : 19,039 acres were under the crop, and there was a very large area, to which it might, under favorable circumstances, be extended.

The quality of the Bijnour Cotton is superior to that of the Doab : export from the district takes place mostly, if not exclusively, towards the north, and much Cotton from the south is brought through it for transmission to the hills.

CSL

KUMAON.

The Kumaon district lies in the hills; it is stated to grow little Cotton, and export none: it draws its supplies from the plain country to the south.

Mr. Finnie, in 1842-43, visited Almorah, and expressed his belief that some of the valleys would grow Cotton well: also that there were extensive tracts of land reclaimable in the Terai, which would prove admirably suited to the plant.

In 1848 the Assistant Commissioner reported that in the whole of Kumaon Proper there were not more than 260 acres under Cotton, which, he said, was rather a garden plant, cultivated for domestic use, than a staple of agricultural produce, grown for the market: nor did he think any land could be spared for Cotton growing in the inner valleys, where all available ground was taken advantage of for producing edible crops: in the Kota Dhoon, however, and the Bhabut, he believed it might be advantageously introduced.

MEERUT DIVISION.

Districts.
ALLIGHUR.
BOLUNDSHAHAR.
MEERUT.
MOZUFFERNUGUR.
SAHARUNPORE.
DEHRA DHOON.

The Meerut Division forms the northern end of the Doab; it extends from Muttra northwards to the foot of the hills, and includes the Dehra Dhoon, which lies within them. This portion of the tract of country lying between the two great rivers is described as presenting here all the characters already noticed: its aridity aggravated as we proceed westwards, and its fertility under irrigation remaining unabated.

ALLIGHUR.

This district lies at the south of the division: it is described as a very fertile tract: Mr. Finnie considered much of the soil well adapted to the Cotton plant, and expresses his amazement at the effect of irrigation

CSL

on a soil which he describes as nearly pure sand, but which, when watered, yielded abundant crops.

In 1848 the Collector reported that in his district there were 69,050 acres under Cotton: he adds:—

"It is impossible to say to what extent Cotton might be cultivated "if a steady increased demand springs up, the only limit to its cultivation would be the quantity of land fitted for its culture, and its "market price compared with that of other descriptions of produce." He thought that no district in the province possessed so many facilities for the experimental cultivation of Cotton: a very large proportion of the soil is suited to the plant: in every part of the district there were influential landholders, who, he believed, would be willing to give their attention to the subject, and employ a part of their land in trying an experiment; and irrigation by wells was so general as to render every kind of crop comparatively safe should the periodical rains fail.

The average yield per acre is stated to be 90 lbs., and the price 2*d.* per lb.

About one-sixth of the annual produce of the district was supposed to be locally consumed, and the rest exported to Mirzapore: its cultivation is generally supposed to be remunerative, less so, however, than indigo.

BOLUNDSHAHAR.

This district lies north of Allighur, which it is said closely to resemble in its physical character: it extends quite across the Doab, including the banks of both rivers for a considerable distance.

In 1848 the Collector reported that there were 14,505 acres then under Cotton in his district—he adds: "The cultivation would greatly "increase provided wells were built; but there is no doubt, on the "completion of the canal, Cotton will be a commodity sown to a great "extent in all districts through which the canal will pass."

The yield per acre was said to be 220 lbs., and the average price 2*d.* per lb.

In 1859 Mr. C. Currie received from the Agricultural Society* six casks of New Orleans Cotton seed: a portion of the contents of two of these germinated: the whole was distributed in the district, but it every where failed. In June he sowed about a biga of land in his own compound: the season was unfavorable: very little rain fell, but he frequently watered the plants: about one-half of the seed sown germinated, and the plants began to yield Cotton in September, since when they had kept bearing Cotton, which was picked every second day up to the date of Mr. Currie's report (26th January 1860). Some landholders admired his crop, and expressed their intention of sowing the seed obtained from his Cotton.

The sample which he forwarded was pronounced by the Cotton Committee to be a good specimen of the kind of Cotton: the fibre was of fair length and good color, strong, and a saleable article, valued at 6¼*d.* to 7*d.* per lb.

In Manchester the Secretary of the Cotton Supply Association described it as a good marketable Cotton, worth 5½*d.* per lb. (at the rates of April 1860.)

MEERUT.

Meerut district lies north of Bolundshahar, in the Doab: it also commands the banks of both rivers for many miles.

In 1838 the Agricultural Society of Meerut sent to the Agricultural Society of India samples of Cotton grown in their garden from Egyptian seed, and also some of the produce of Chinese Nankeen seed.†

The Egyptian Cotton was pronounced by the Committee to be a fine specimen of its kind, equal to the finest Egyptian grown, and worth 11*d.* to 13*d.* per lb.

---

* Agricultural Journal, Vol. XI., page 417.

† Agricultural Transactions, Vol. VI., page 114.

The Nankeen had "a good hardy staple," but its brown color unfitted it for the European market.

In 1848 the Collector reported that there were 23,046 acres of land in his district under Cotton, and that 29,731 were supposed to be suited to the crop: the average price was 2*d.* per lb.

In 1853 Mr. C. Gubbins addressed the Agricultural Society on the subject of the produce of the native Cotton plant, when treated as a perennial: he believed the produce to improve in quality: the plants will, when cared for, grow and flourish for several years.

The Committee did not consider the difference very marked, but agreed with Mr. Gubbins in thinking it in favor of the second year's yield: both the samples sent were considered very good specimens of indigenous Cotton.

MOZUFFERNUGGUR.

This district lies still further north than Meerut, and, like that district, stretches quite across the Doab, from one river to the other.

In 1848 the Collector states that 15,601 acres were under Cotton then, and that an increased demand would add 1,000 to 2,000 acres more to that area: the average yield was 117 lbs. per acre.

SAHARUNPORE.

The Saharunpore district forms the northern end of the Doab; it lies between the two great rivers at their exit from the hills. As early as 1827 Dr. F. Royle made an experiment at the station, on two kinds of exotic Cotton, the Bourbon variety, and the *Gossypium arboreum*, which is, I believe, the plant sometimes called *Nurma**: this last, he says, he did not succeed in materially improving, but the Bourbon grew very finely: he had the advantage of irrigation whenever needed, and the plants became very large and vigorous: they, however, bore little Cotton, and the result was generally unsatisfactory.

---

* Other varieties are so called, and this one spoken of by other names.

CSL

In 1848 the Collector stated that there were 30,637 acres of land under Cotton, and that an increased demand would extend the crop to 8,789 acres more, but that the price was, as compared with neighboring districts, already high, and that a farther increase was improbable. The yield per acre was 117 lbs., and the average price 2·2*d.* per lb. All the Cotton exported from the district was sent to the westward.

Dehra Doon.

This district includes a small portion of the hilly country north of the Doab, of which it is a part: it mainly consists of a valley enclosed between the Sewalik Hills, a minor detached range, and the mass of the higher hills beyond.

In June 1837 Mr. Kirke sowed some Upland Georgia seed in poor stony soil: he also sowed some on fair good soil, and some more on rich garden soil, and tried the effect of planting at different seasons, from March to July: he thinks that as the plants stood in August, he had sown his seed too thickly.

He subsequently tried some native kinds of seed, which he states to have been greatly improved by careful culture.

He again mentioned in 1838 that he had some Egyptian plants in a most flourishing condition in his garden.

None of the further result appear to have been recorded. In 1842-43 Mr. Finnie sent samples to the Agricultural Society, of Cotton which he had found growing in the Dehra Doon: he states that the plants looked as healthy, and the crop as well "as he had seen in Louisiana"; and the Society's Cotton Committee fully confirm his statement as far as the samples go.*

The Cotton which Mr. Finnie admired may possibly have been descended from the seed sown in 1839, of the Egyptian and Sea Island kinds: if so, they must have much improved since the samples of their first season's growth had been picked.

---

* Agricultural Journal, Vol. II., page 204.

Mr. Smith, of Delhi, sent some of these to the Agricultural Society in 1840: and they were pronounced by the Cotton Committee to be unequivocally bad, and to show great and rapid degeneracy: they were clean, and of good color, but short, and irregular in staple.*

In 1848 the officer in charge of the Dehra Doon reported that the district grew very little Cotton even for local use, and exported none.

DELHI DIVISION.

Districts.
GOORGAON.
DELHI.
ROHTUK.
PANIPUT.
HISSAR.

The tract included in the Delhi division extends along the right bank of the Jumna, from Muttra northwards: and lies between the river and the native states which stretch from Bundelkhund to Puttiala: it thus forms the west extremity of the North-West Provinces of Bengal: part of this country is now included within the local boundaries of the Punjab.

The Commissioner reported in 1848 that only one 107th part of the total area of the division was under Cotton cultivation, namely, about 71,852 acres: in the event of an increased demand he anticipated an increase of 15,952 acres: he gives these figures as they were supplied by the different Collectors, and states his belief that the land stated to be now under the crop is rather under than overrated, on the following grounds: large exportations annually took place, and if the number of acres reported to grow Cotton be multiplied by the average number of pounds produced per acre, and the result divided by the number of the inhabitants, the quantity of Cotton allotted to each individual would thus be 7 lbs. for annual consumption: if, however, the quantity known to be exported be taken into consideration, as well as loss in manufacturing, (not loss in cleaning, for the estimates

---

* Agricultural Transactions, Vol VIII., page 245.

MINISTRY OF CULTURE · GOVERNMENT OF INDIA · सत्यमेव जयते

CSL

are all made in clean Cotton,) the quantity available per head will be only 2 lbs. per annum: an amount insufficient for the poorest peasant: for these reasons he thinks that a much larger area than that stated actually grows Cotton.

GOORGAON.

This district forms the south end of the division: it extends to the frontier of the Rajputana territories, and reaches the Jumna on the east. The Collector, in 1848, reported that there were 29,617 acres under Cotton, and that the crop might cover 35,418, under favorable circumstances: the average yield per acre was 126 lbs., and the average price 1·76*d.* per lb. The Cotton of the district was purchased by traders chiefly for the Calcutta market: the Pergunnah Pulwul is mentioned as particularly suited to grow fine Cotton.

DELHI.

The Delhi district lies on the right bank of the Jumna, north of Goorgaon.

Major J. Colvin, writing in 1834, says that some years previously he had obtained a small supply of Upland Georgia seed; out of this only a dozen vegetated, and only five plants came to maturity, and yielded ripe pods; with the seed obtained from these, he, in the following year, sowed several small patches at various places along the canal; (not all in this district apparently) the aggregate area was too small to warrant any calculations being based on the amount of its produce. The yield was, however, certainly greater than that of the ordinary native Cotton: and twice as much was picked from the plants of the second year as from those of the first: from the original five plants, too, he picked a much larger quantity of Cotton in the second season than they yielded in their first, and he believes the quality of this second year's crop to be decidedly superior to that first picked.

He anticipates a "permanently valuable addition to the produce of the country."

He received in 1833 larger supplies of Upland Georgian Cotton seed, also of Sea Island seed: these he had distributed extensively: the latter had every where failed to germinate, the former had every where grown, and was then growing in, probably, a hundred different villages: in some places an excessive fall of rain had destroyed this exotic, along with the common native Cotton crop, but there was a large proportion of it safe and prosperous.*

In 1836 the same officer reported that he hoped to have in that year about 150 acres sown with the seed obtained from the above-mentioned crop.

Again, in 1837, Major Colvin reports that a hundred villages along the canal had each a biga of Cotton sown with Upland Georgia seed: that it had been sown almost exclusively on poor sandy soil, which was useless for any other purpose; but that, nevertheless, the produce was in quantity at least equal to the most prolific of the native sorts, and the quality superior; the seed was that of crops of previous years, and the fifth in descent from that imported. He forwarded samples to the Society.† The Committee report that in picking the sample some of the ordinary native Cotton was mixed up with the exotic: exclusive of these evidently *inferior portions*, the Cotton was fully equal to the same kind grown in America, in length and fineness of staple, but that it had lost something in strength: if in this respect the degeneracy was real, it was very slight. Mr. Willis, Member of the Committee, considered the sample as not equal to the corresponding American kind, but 25 per cent. superior to any native Cotton.

In 1837 Mr. G. H. Smith tried Upland Georgia, New Orleans, Sea Island, and Peruvian seed in his garden at Delhi: all, save the last, germinated, and in September of that year were healthy and beginning to flower: from the Peruvian seed he did not obtain a single plant.

---

* Agricultural Transactions, Vol. II., page 127.

† Ibid, Vol. III., page 210.

GSL

Samples were submitted to the Cotton Committee in 1838*: they considered the Upland Georgia a very good speciman of its kind, not quite equal to the produce of North America: they thought it probable that the deterioration was due to the age of the seed or unskilful culture, and did not suffice to prove degeneracy as a necessary result of the natural conditions of soil and climate.

A second sample was sent, described as being "the same Cotton grown in 1838: the Committee were at a loss to know whether it had been picked from the same plants as those which had yielded the former sample, or from plants raised from the seed of the former crop: the question was one of considerable interest, although as the second specimen was decidedly superior to the first, the fact, on either supposition, suggests that no degeneracy need be feared.

In August 1840 Mr. G. H. Smith sent to the Society† samples of several kinds of exotic Cotton grown by him at Delhi: they were

Egyptian,
Upland Georgia,
Sea Island, and
Nankeen.

Of these he gives the preference to the Egyptian and the Upland Georgia: he, nevertheless, states that, taking his actual returns, the Nankeen had proved the most prolific, and the Upland Georgia the least so: the Sea Island and the Nankeen were, however, very much more injured by insects than either of the others: in the former one-half of the gross yield was more or less spoiled by the grub which attacked one seed in each pod, whereas the Egyptian and Upland Georgia suffered only to half that extent, one-fourth being more or less soiled.

---

* Agricultural Transactions, Vol. VI., page 108.

† Ibid, Vol. VIII., page 225.

CSL

He prefers a light sandy soil for all Cotton ; if the soil be moist, the roots will rot, and blight ensue : if rich, the plants will run to leaf and give but little produce.

The land should be thoroughly ploughed, long intervals being allowed to intervene between each ploughing : weeds should be picked out, and manure added if the land is very poor, or has been over cropped. Where irrigation is available, the best time for sowing is April and May, but where the plants cannot be watered, the first showers in June and July must be waited for,—when the plants are irrigated the trenches used for that purpose should be filled in before the rains, to prevent the water then lodging about the roots.

The seed ought to be soaked in water before sowing; if they do not germinate in twenty days, fresh seed ought to be put in: when the plants are three or four inches high they should be thinned; and when two or three months old, all but one should be removed from each stand: the field should be weeded once a month, and hoed well; the weeds should not be left lying on the ground: some recommend that when the plants are eighteen inches high the top of each should be cut off.

If irrigated, the plant will yield two crops in the year; the first may be ripe in September, and the picking lasts until January: the plants should then be pruned : whether it answers best to cut them down to eighteen inches, or to leave them 4 feet high, he does not yet know: the second crop, which is, however, a scanty one, may begin to be picked as the hot winds set in; and lasts until the rains commence. After this crop, as after the former, the plants must be pruned, and the ground cleared of all weeds, and well hoed.

When the Cotton is ripe too much attention cannot be paid to the gathering: the fibre should be carefully picked out of the pods, which should not themselves be removed: at the picking three qualities should be distinguished and kept separate: and no dirt or leaves be mixed with the fibre: picking should not begin until the dew has dried off in the morning. The plants should be left standing as long as they continue to yield, and each one replaced as it dies off.

He deprecates the supposition that his methods will be found universally applicable, and recommends experiments, and a discriminating selection of soils.

Produce per biga of 4,025 square yards, in mans, seers, and chittacks—

Egyptian	7	32	0	raw	1	38	0	clean.
Upland Georgia	3	30	12	„	0	37	12	„
Sea Island	5	35	8	„	1	18	14	„
Nankeen	7	20	0	„	1	35	0	„

That is in lbs. per acre, Egyptian 187, Upland Georgia 90, Sea Island, 130, Nankeen 180.

Mr. Smith, in forwarding samples of these several kinds of Cotton to the Society, says that he despairs of ever seeing fine kinds of exotic Cotton extensively introduced into the Delhi district, except through the direct intervention of Government.

Seed, specially of the Upland Georgia kind, had been distributed in hundreds of villages situated in the most eligible parts of the country, and instructions given to the villagers as to the best modes of growing the crop: but in no single case had he ever heard of their obtaining a footing any where; on the contrary, the cultivation had always been given up after an imperfect trial in one season.

Europeans, too, have tried the cultivation on an extensive scale, but it has been found impossible sufficiently to economise labor, to make the crop pay; and he doubts if it ever can be made remunerative by paid labor: that it would be so to the villager he is certain, and believes that on the contract system it might be made profitable on a large scale.

He suggests a plan: a grant of a certain number of villages should be made by Government to a skilled planter, who should commence cultivating small patches of exotic Cotton, by paid labor, in several

GSL

different places throughout the estate: he should then force the villagers to extend a similar kind of cultivation over their own lands, and at their own cost and risk, but under his general supervision, so as to ensure that the crop was properly treated: this forced crop would, he thinks, be found to pay the cultivators handsomely, and would end by being voluntarily extended. To ensure this, an agency must be established for the purchase of this foreign Cotton, at rates proportioned to its value: the ordinary market does not discriminate between qualities, but an agency of the kind suggested would do for the dealers what the forced cultivation in a few villages would do for the cultivators at large, namely, instil the conviction that the commerce (as well the cultivation) of exotic Cotton is capable of being made profitable.

Samples of Mr. Smith's Cotton were examined by the Cotton Committee; they had unfortunately been bowed and carded, besides being churka-cleaned.

The *Egyptian* had been injured by the bow, but was of a good color, fair staple, and tolerably regular: readily saleable at home.

The *Sea Island* was thought a useful and valuable Cotton, good regular staple, of fair strength; it also had been injured by the bow.

The *Upland Georgia* had a good color, but was deficient in staple, and irregular.

The *Nankeen* would, from its color, be quite unsaleable at home.

In 1848 the Collector of Delhi reported that, taking the average of the six previous years, the extent of the Cotton crop was 3,321 acres in the district; that area might, he thought, be doubled; but there were several obstacles to a very great extension of the crop: the soils of the whole district were divided into four classes, the *Khudir*, the *Dabur*, the *Nuhree*, and the *Baranee*: on the former Cotton is seldom sown, as they are subject to inundation. Again it is not thought profitable to cultivate it on the Baranee lands, and hence the principal Cotton

CSL

cultivation is to be met with in the canal villages, or on such *bangur* lands as have irrigation from wells.

The crop requires much labor, is considered uncertain in its returns, and the people prefer to grow esculents. A farming system, which to a considerable extent prevailed in the district, is another obstacle to the extension of the Cotton crop: the farmer exacts from the cultivator a rent fixed according to the crop he sows: for Cotton the rate is high, and the uncertainty of the return operates against it here, as the established rent is exacted whatever be the outturn.

The average yield per acre is said to be 103 lbs., the average price a little under 2*d.* per lb.

Delhi Cotton is sent for sale into Rohtuk district, but the amount exported is believed to be inconsiderable.

In 1859 Mr. Lionel Berkley tried New Orleans, Mexican, and Pernambuco seed, at Delhi; in September of that year his plants were all thriving, the two former yielding Cotton, the latter in flower: he had cultivated carefully, and sent samples for the inspection of the Cotton Committee.

They reported* that the *Mexican* sample was a beautiful specimen of its kind, soft, strong, and of good staple and color, and a valuable Cotton, worth 7¼*d.* per lb.

The *New Orleans* sample was also thought a very fine specimen, good strong fibre, and fair length: was slightly tinged in color, probably from having been picked in damp weather: worth 7*d.* to 7¼*d.* per lb.: both samples were said to have suffered to some extent in cleaning.

Mr. Berkley confidently asserts that either of those kinds of Cotton can be grown as easily and cheaply as the common Cotton of the country, and that any desired quantity can be secured by engaging

---

* Agricultural Journal, Vol XI., page 418.

CSL

to purchase it of the villagers, who readily appreciate its superiority, but if they grew, could not at present sell it.

ROHTUK.

This district lies on the west of Delhi, in which it is, by the last surveys, included.

In 1848 the Collector reports that there were 14,529 acres under Cotton, which might be extended to 18,750 acres: the average price was about 2*d*. per lb.; the Cotton of Rohtuk was sent to Agra, and there put in boats.

PANIPUT.

This district lies along the right bank of the Jumna, north of Delhi and Rohtuk.

In 1848 the Collector stated that there were 14,820 acres under Cotton, and that the crop might be extended to 16,703 acres.

The average price was under 2*d*. per lb. The Cotton grown in this district was exported to the north and west, and never sent down the Jumna.

HISSAR.

The Hissar district extends west from Rohtuk and lies between the Sikh country to the north and the Rajput state of Bickaneer to the south.

In 1836 Colonel Skinner sowed 182 bigas of land in this district, with Upland Georgia seed. He was prevented from carrying on the experiment in 1837 and 1838, by the extreme drought of those years, and the famine which the want of rain had caused in that part of the country.

He gives the following profit and loss account of the trial* he made:—

Paid for ploughing, sowing, weeding, picking of the Cotton, land rent, and water revenue	Rs.	1,627	3	0
Deduct cash received by sale of seed...	„	384	0	0
Nett cost of production	Rs.	1,243	3	0

---

* Agricultural Transactions, Vol. VI., page 120.

His crop consisted of 558 mans of raw Cotton, which yielded 171 mans of clean.

Cost of production then comes to 2·26*d.* per lb.

Paid for screwing, packing, &c.	Rs.	92	0	0
Customs dues	„	70	6	7
Carriage by land to Delhi, and by water thence to Calpee	„	220	0	10
Carriage from Calpee to Calcutta	„	197	8	11
Commission charges	„	115	6	4
Total cost of transport	Rs.	695	6	8

The cost of transport, &c. thus comes to 1·15*d.* per lb.*

Total cost, laid down in Calcutta, ...	Rs.	1,938	9	8
(That is at the rate of 3·4*d.* per lb.)				
It sold there for	„	2,022	0	0
At a profit of	Rs.	83	6	4

(The price fetched in Calcutta being 3·54*d.* per lb.)

The yield per biga was 75 lbs. of clean Cotton: Colonel Skinner does not state the equivalent of the biga which he used in the calculation, but if we assume it to be that common in the province, namely, 3,025 square yards, we shall have a yield per acre of 120 lbs. : the proportion of clean to seed Cotton was 31 per cent. Colonel Skinner states that although this Cotton cost twice as much in cultivation, it realized only the price of the common Cotton of the country ; and that the profit was insignificant, and not calculated to induce the farmers of the district to follow his example, which they seemed inclined to do, had the experiment proved remunerative in his case. Although he is thus justified in considering it a failure, the results are very instructive.

The cost of transport was excessive, and could, it is supposed, be materially reduced : the item of Rs. 70 for customs dues would not now have to be included, and cost of screwing, packing, commission, &c., would be diminished in the case of large quantities regularly exported.

---

* It should not be forgotten that packing, screwing, bags, ropes, customs, dues, insurance, commission, &c., are all included in this so-called cost of transport.

In 1848 the Collector of Hissar reported that in his district there were 9,271 acres under Cotton cultivation, but that no material increase could take place without an extension of the existing means of irrigation.

The only other irrigated crop cultivated to any great extent was wheat, and notwithstanding a higher price and increased demand for Cotton, the area then used in growing wheat would not, he believed, be considerably diminished. The improved and extended means of irrigation, then being made available, would, he thought, if accompanied by a rise in price, add to the existing out-turn of Cotton from the district. He estimated the cost of transport from "Hansi to the Sandheads" at Rs. 2-2 per man, or 0·63*d.* per lb.*

The average yield was estimated at 180 lbs. per acre, and the price at 2*d.* per lb.

---

* Very inconsistent with Colonel Skinner's experience ten years before, and suggesting that the cost was in his case excessive.

CSL

Section III.*

OUDE.

The province of Oude is a part of the great plain of the valley of the Ganges which has been already described (as far as available information furnished the means) under the head of the Upper Provinces of Bengal. It extends from the foot of the hills to the Ganges, and lies between Goruckpore on the east and Shajehanpore on the west: its climate and general physical characters may be considered as transitional between those of these two districts: on the north a portion of it is described as benefiting by the proximity of the mountains, which is said to modify the rigors of the hot winds, and supply moisture to a certain limited extent to the soil: on the south it resembles the Doab, on which it borders: much of the province of Oude is said to be of great fertility, and some portions of it are stated to offer exceptional advantages for the cultivation of Cotton.

In 1849 Mr. Purvis, who had charge of the public garden at Lucknow, sent the Agricultural Society samples of Cotton raised there from the Coimbatore *Mexican* seed.†

In July 1848, a plot of land was prepared for the seed by irrigation, and twice ploughed; the soil was good, and the seed was sown in drills, three feet apart; for ten days little rain fell, but on the 2nd of August there was a heavy fall, and the plants had all come up vigorously before the 7th.

---

* The system so far adopted, of placing the information relating to each district or subdivision of a Province by itself, cannot be followed further: the data for the subject matter of Section III. are too meagre and diffuse to admit of it generally, but wherever practicable it has been done.

† Agricultural Journal, Vol. VII., page 195.

CSL

When six inches high they were thinned out to a distance of a foot and a half apart: on the 14th and 15th, there was rain again, and the plants grew rapidly and healthily: there was rain again on the 26th, 27th, and 28th: previous to this the field had been weeded and hoed; on the 9th and 10th of September there was more rain. On the 16th a few of the plants blossomed, and having become crowded, some were again removed until they stood two to three feet apart: they were also weeded and hoed: dry winds prevailed, and there was no more rain during the month. On the 1st October the ground was irrigated, and the whole of the plants were in blossom, and "in many places growing into a jungul;" on the 5th there was a little rain, and irrigation was again applied on the 19th: on the 27th some Cotton was picked from those plants which had come first into blossom: on the 18th November, irrigation was again tried: about this time a red insect attacked the pods, which subsequently did great mischief: many of the plants stood five feet high at this time, and as they spread four feet at top, suffered from crowding in some places. In March 1849 the whole crop was in a most flourishing condition, from 40 to 50 bolls on each plant, and yielding Cotton well.

Another plot of ground had been sown on the 9th August, and the young plants were up on the 16th: they were treated as this crop had been, but were not nearly so robust, which Mr. Purvis attributes not to the season at which the seed was sown, but to the superiority of the soil in the former case.

A third plot of ground had been sown on the 24th October, but the seeds did not germinate. The Society's Cotton Committee thought the sample tolerably clean, short stapled, very adherent to the seed, of fair strength and good color, worth 4¼*d.* to 4½*d.* per lb.

A second sample which was sent was of a finer staple, but stained.

In March 1860,* Captain E. Thomson furnished the Secretary

---

* Agricultural Journal, Vol. XII., page 18.

CSL

of the Agricultural Society with a memo. on the cultivation of Cotton in the Seetapore district.

The only Cotton generally grown is of the common indigenous kind.

Small quantities of American seed had been occasionally tried by Europeans: Captain Thomson had found some plants of New Orleans Cotton growing wild in a hedge-row at the time of the re-occupation of the province: they must have been self-sown for two or three years.

Mr. Blechynden had furnished him with fifteen casks of exotic seed for distribution: some of this arrived in a damaged state: some germinated. Of that which had germinated a large proportion yielded no produce, owing to the ignorance or wilful mismanagement of the growers. He attributed the failure to several causes.

The seeds had been sowed too deep, so that subsequent rain and heat had baked the earth over them into a hard mass, through which they could not grow.

Want of water between the end of the rains and the cold weather.

Poverty of soil.

He found the same seed, when properly treated, succeed admirably: in good soil, with moderate irrigation when the rain failed, it had done well. "In the garden of Mirza Abbas Beg a small patch of one cutcha "biswa of good land, unirrigated but influenced by moisture from a "watercourse which passed along one side of it, produced Cotton which "sold for 7½*d.* per lb., in such quantity that the yield was at the rate "of Rs. 75 per acre, exclusive of seed.

"The district enjoys every variety of soil and climate, from the "rich, moist, alluvial soil on the banks of the rivers, where the air is "moist and comparatively cool, to the high and unprofitable tracts "known as Bhoor, where cultivation of every sort is scanty, and "irrigation almost impossible, owing to the distance of water from "the surface.

"Irrigation is sparingly used in the Cotton cultivation of the district. Usually the rains afford sufficient moisture to ensure a moderate crop, and the cultivators being for the most part very poor, "have not always the means, and often not the will, to give the trifling "irrigation which I have pointed out as a necessary remedy for the "occasional severe drought immediately after* the commencement, and "at the close, of the periodical rains. Undoubtedly irrigation may "be made available, and is to some extent already employed, to the "manifest improvement of a crop which without it would often be "stunted and scorched."

He does not think any very material extension probable, for although the land under Cotton has increased since the annexation, and although it may still be farther increased, yet seven-eighths of the district (of Seetapore) are unfitted for the crop "by the poverty and quality of the soil."

The district does not now grow enough for its local consumption, and imports from Rohilkund: the price of Cotton in the bazars ranges from 3*d.* per lb. in plentiful years, to 5*d.* per lb. in bad seasons: he does not think the price will decline.

The means of transport furnished by the Gogra and the Ganges leave little to desire in this respect.

PUNJAB.

In a letter dated December 1846, Mr. Vansittart gives some account of the Jullundur Doab.

There were 8,000 acres then cultivated for Cotton: the seed was sown broadcast in July: such Cotton as is sown on low lands near rivers does not require irrigation, but the produce is very inferior: the Cotton cultivated on the higher lands is sown in March, and

---

* Quere *before*.

CSL

irrigated, when the soil is sandy, five times in the season : the fields are weeded during April and May, and picking commences in October : the first picking is best, for in November all pods are indiscriminately gathered, whether unripe or fallen to the ground from over-ripeness, clean or dirty. A worm sometimes attacks the seed, and spoils the fibre of the Cotton : dry sandy soil near Jullundur is preferred for Cotton to that lying along the Sutlej : it, however, requires irrigation : irrigation by wells is expensive, and other crops yield a better profit than Cotton.

The description of Cotton grown in the Jullundur Doab is considered very fine, but for the above reason it is only grown for home use : the district imports largely from Hansi.

" After the most careful calculation I fix the average return of " Cotton on a given acre at 692 lbs. : such raw Cotton, when cleaned, " will in my best districts yield one-third, or a fractional part less than " one-third, of pure Cotton."

Value of 230·6 lbs. of clean Cotton	Rs.	20	8	0
Ditto 461·4 „ seed	„	4	6	3
Total value of crop per acre ...	Rs.	24	14	3

Speaking of this return of 230½ lbs. per acre, Mr. Vansittart says there " is no doubt that the return is small when compared with the produce " grown on a given acre in the Hansi and southern districts."

At Ruhor, where there is a manufacture of cloth carried on, the coarser stuffs are made of Hindustani Cotton, and the finer from that grown in the district.

Some Egyptian Cotton seed had been sown in the previous August, but the plants had been killed by the frost before they could ripen their pods.

The crop cannot be extended without increased means of irrigation.

In January 1847 Doctor Sill reported on the Cotton cultivation of the Jullundur Doab.

CSL

The flourishing aspect of the crops when he saw them in November 1846, left no room to doubt that the soil is in an eminent degree adapted to the plant: it differs entirely from the Cotton soil of Bundelkhund, and Dr. Sill attributes its excellence as a Cotton soil to the presence of kunkur, partially at least: great facilities exist for irrigation, which render the plant independent of the season: Cotton fields are found in every part of the district save only on land subject to inundation.

If irrigation be available the seed is sown in March, if not, the commencement of the rains is waited for, as in Hindustan: little or no manure is used, the Cotton seed is always sown alone, and not mixed with other crops in the same field: it is weeded, and well cared for: the seed seems always to be sown too thickly, so that, especially on irrigated land, the plants are crowded together, have no room to throw out lateral branches, and shoot up into long, woody, unproductive stalks: with this exception, the modes of culture are praised: the picking and cleaning are, however, so carelessly managed that half the value of the crop is lost.

The average produce is stated to be 207½ lbs. of clean Cotton per acre on irrigated land, and 168 lbs. without irrigation. Dr. Sill considers these figures as understating the actual produce: he says that the landholders feared there might be a tax imposed, and returned less than the true amount of their crops: in the Byrowal and Umritsur districts he found good reason to believe that the crops ranged from 264 lbs. to 306 lbs., and in Deenanuggur exceeded the latter.

He considered the quality of the fibre to be fine, long, and silky: it is, he believes, deficient in strength, a defect which he considers remediable by care in cultivation: the fibre separates readily from the seed; as to the proportion of the weight of the wool to that of the seed, he makes the following statement.

CSL

"kunkur (which is found in all parts of the Upper Provinces, whether "the soil be adapted to Cotton or not) prevails in the Doab, proves "nothing: I have always observed that the soil which produces grain "in abundance is of a fertile description, and is suited for Cotton: there "is hardly any grain in the Doab.

"The best and finest kinds of Cotton are produced where irrigation "is impracticable."

He believes the scarcity of manure would prove fatal to the improvement or extension of Cotton cultivation in the Doab: he does not believe that the Jullundur Cotton is more carelessly picked and cleaned, or dirtier than that of Hindustan: as to quantity of produce, he considers Dr. Sill's estimate of 207 lbs. of clean Cotton per acre fair, but does not believe there is the difference stated by that officer to exist between the yield of the irrigated and unirrigated crop: he doubts the correctness of Dr. Sill's estimate for Byrowal and Umritsur. Dr. Sill says that "there is no material superiority in the "quality of the produce of any one part over another, but the "pergunnah of Kaboon perhaps furnishes the best."

Mr. J. Laurence states, on the contrary, that "there is very "considerable difference in the different kinds grown in the Doab: "the neighborhood of Kaboon is not famous for Cotton": on the contrary, the Kaboon soil ranks as fourth-rate.

He believes that although some fine Cotton is produced on the low hills to the north, the Cotton of the Doab is not, as Dr. Sill believes, in any way superior to that of Hindustan. "It would be difficult to "increase the productive powers of the land by manuring it, if, indeed, "the doing so would not injure the quality of the crop."

The soil of the Doab is not adapted for Cotton cultivation, it grows Cotton for local consumption only: the climate is still less suitable than the soil: the cold sets in early and the frost is severe, and would kill the plant before it could ripen its pods; in conclusion, he states

CSL

his belief that it is a fallacy to suppose Cotton is, or could be, largely grown in the Jullundur Doab.

The next notice which I find of the Punjab refers to the district of Leia, on the banks of the Indus. Captain G. E. Hollings furnished the Agricultural Society* with a memo. on the subject of Cotton cultivation: every village in the district grows Cotton for local use: formerly there was no trade, and even now the export is small: the Cotton is very short stapled, but white and fine; he thinks that the cost of production would be 5*d.* per lb.

In April 1851 he obtained some Mexican Cotton seed: he sowed this carefully, but an inundation in July and August totally destroyed his crop: Sub-Assistant-Surgeon Ramsoonder Ghose, however, to whom he had given some of his seed, was more fortunate: his plants yielded him a good crop and a fresh supply of seed was obtained from them: the plants were left standing, and although they were totally neglected, some well-grown full pods were obtained from them in the second year.

Early in 1852 Captain Voyle sowed some seed which he had obtained: Captain Hollings himself also sowed again.

The seed was set in drills 4 feet apart, and the ground had been well prepared; it was manured and then ploughed over three or four times: the shrubs attained a great size and grew healthily: in September "the leading shoots were topped, which is a practice adopted throughout the district." The plants in his garden had an ample supply of water, but he had no reason to suppose that their produce was greater than that obtained from the fields: nor could he perceive any difference between the produce of the seed freshly received and of that from last year's plants: but he believes that had the plants left standing from last season been well cared for, they would have produced the best Cotton of all.

---

* Agricultural Journal, Vol. VIII., page 136.

CSL

In his own and in the public garden he had some indigenous Cotton seed treated exactly as the Mexican seed had been, but the plants thus cultivated did not produce more abundantly than the village crops.

He found that one pod of the Mexican Cotton weighed as much as four pods of the native kinds ; that of the latter the weight of the seed equalled three-fourths of the gross produce: while in the Mexican Cotton it was less than two-thirds. "The soil on which the native "crop grows best is apparently pure sand, but there is throughout the "district much salt on the surface of the ground."

He subsequently found, on careful examination, that the indigenous Cotton he had cultivated carefully in the public garden was far superior to that of field growth, both in quantity and quality.

Mr. J. Prinsep, writing from Buttala, in June 1853, states that he had distributed exotic seed obtained from the Agricultural Society* among the landholders of his district: he also sowed some himself which came up well. The fresh seed does not, however, grow so healthily as that obtained from plants of one or two seasons' growth in India : he had sown some gathered from plants raised in the previous season at Sealkote: the people always admire the exotic Cotton, and he believes that it will be extensively introduced into cultivation, unless, indeed, the untoward failure of some crops at the commencement of the experiment discourages them.

He sowed a plot of land with Petti Gulf and Sea Island seed fresh imported: seven or ten days after a second plot, exactly the same size, was sown with Petti Gulf seed acclimated at Sealkote; all the seeds of the latter germinated, whereas of the former a plant appeared only here and there, besides which the acclimated seed grew far more vigorous plants.

Mr. James Cowell pronounced the samples sent to him "pretty fair in staple and soft, adhering tenaciously to the seed, as all those "varieties do ; it is a useful fibre."

---

* Agricultural Journal, Vol. VIII., page 188.

In February 1855 Mr. Prinsep again addressed the Secretary.*
" I send you a specimen of American Cotton grown in my garden ; it
" looks very fine and soft : the bushes from which it has been picked
" have been in the ground for two years : they were cut down at the
" end of the first year and allowed to spring up again : the produce, I
" think, is better than the first year's : the soil of my garden is not
" at all rich and loamy, but sandy and requiring manure to give it
" firmness and make it yield."

The Cotton Committee report that the " color, length, and strength
" of fibre and the feel or touch is excellent : it is descended apparently
" from the green seed or short-stapled variety, either Petti Gulf or
" New Orleans, and is a good and useful Cotton for the European
" markets, worth 4½*d.* to 5*d.* per lb."

In March 1861 the Financial Commissioner of the Punjab, under instructions from His Honor the Lieutenant-Governor, issued a circular to the revenue officers of the Province, requesting information on the quesiton of the Cotton-producing capabilities of their respective districts.

The following table contains an abstract of the returns received :—

DIVISIONS.	Area cultivated with Cotton.	Average per Acre.	Average price.	Estimated aggregate out-turn.	Estimated aggregate value.	Quantity exported.
	Acres.	*lbs.*	*d. per lb.*	*Mans.*	*Rupees.*	*Mans.*
Delhi†	24,211	94	2·87	28,672	2,75,331	22,448
Hissar	40,819½	149	2·00	76,208½	5,22,275½	32,776
Cis-Sutlej States	50,707	91	2·40	58,195½	4,55,958	....
Trans-Sutlej States	47,795	146	3·00	87,339	8,68,658	3,500
Umritsur	73,324	96	3·20	87,945½	9,37,366	29,012
Lahore..	42,230	61	3·00	36,552	3,75,604	10,292
Rawul Pindee	72,747	61	3·27	56,015	6,05,214	12,543
Mooltan	56,350	88	3·69	62,267½	7,77,505	17,179
Derajat	39,400	70	4·00	34,465	4,48,110	36,700
Peshawur	19,930	53	4·36	13,800	1,98,866	1,775
Average for Province ..	4,67,513½	92	3·00	5,41,460	54,64,887½	1,66,225

---

* Agricultural Journal, Vol. IX., page 188.

† In older Returns this division as well as Hissar formed part of the North-West Provinces.

CSL

In the Delhi division the districts of Goorgaon and Kurnal send their Cotton down the river to Mirzapore, but the Delhi district exports large quantities into Rohilkund.

In the Hissar division there are two crops: one sown in April and May, and gathered in October and November; the other sown in July, and gathered later than the first; some of the Cotton of the Rohtuk district is sent into the Punjab, some down the river.

In the Trans-Sutlej States the time of sowing is March and April, and of gathering October and November: in Hooshyarpore the crop is left standing two years, in the second season the quantity is small, but the quality considered very superior. The Jullundur district exports Cotton to Hooshyarpore and Kangra.*

From the Umritsur division the Cotton grown in Sealkote is sent to Mooltan, the Salt-range, and Jumoo; that grown in Goordaspore to Lahore: the officer in charge of this last district states that the indigenous Cotton plant is dwarfish and weak: but the New Orleans kind evidently takes favorably to the climate. Mr. J. H. Prinsep, when Assistant Commissioner, distributed seed in the Buttala Pergunnah, which the people who received it still grow; they treat it as an annual, sowing it fresh every year: but there are at Goordaspore five or six plants five years old which yield Cotton every year: they require the earth loosened about the roots and to be watered: the seed is valued by the people, and those who possess it are jealous about giving any to others: when well cultivated this Cotton has not deteriorated in quality, and "in proper vigor it produces close on eight mans "per acre."

The usual time for sowing in the Lahore division is February and March on unirrigated land, and on irrigated land April and May; the crop is gathered in October to December: as a rule, the plant is treated as an annual, but it is sometimes allowed to stand: the yield is less in the succeeding years than in the first. From

---

* Jullundur was formerly stated to import Cotton largely.—See ante.

CSL

Goojranwalla the Cotton is sent to Sind, the Salt-range, and Peshawur: from Lahore, into the adjoining districts.

In the Rawul Pindee division the time for sowing varies from February to May, and that of gathering from September to December: in the higher lands the crop is frequently allowed to stand for a second, and sometimes, although rarely, for a third season; the produce being less in quantity and worse in quality each year: elsewhere the plant is treated as an annual.

In 1853 the Deputy Commissioner of Shahpore introduced some American Cotton seed into that district, and in 1855 excellent Cotton was grown from the acclimated seed. Captain H. E. Paske submitted samples of the produce to Cotton spinners in Manchester, who pronounced it to be little inferior to American-grown Cotton: the Cotton of the Rawul Pindee district is taken across the Sutlej to Peshawur and Kohat: that grown in Goojrat, to Cashmere and the Salt-range; and the crop of the Shahpore district, to Cabool, and to Jhung and Mooltan.

In the Mooltan division the Cotton crop is sown from March to May, and gathered from September to December: it is rarely allowed to stand beyond the first year. The soil of the Jhung district is stated to be well suited to Cotton: irrigation alone is needed: the whole of the Bâr might grow Cotton: and the Chenab river offers peculiar facilities for sending the produce down to Kurrachee: from Mooltan the Cotton is exported chiefly towards Kurrachee and Bombay, some to Derajat and some to Bhawulpore; from Mozuffurgurh the exports go towards Sind.

In the Derajat division the Bunnoo and the Dera Ishmael Khan districts sow their Cotton in March and April, and Dera Ghazee Khan in May and June, and the crop is gathered from September to December: in the two former districts the plant is frequently allowed to stand for two and sometimes three years, and the second year's crop

CSL

is best both as regards quantity and quality: in Dera Ghazee Khan, on the contrary, the crop deteriorates after the first year, and is seldom allowed to remain a second: the latter district is well watered by canals: Cotton is exported into or across the neighboring hills of the Sooleemanee range, and some to Kurrachee and Bombay.

In the Peshawur division Cotton is sown from April to June and picked from September to December: as a rule the plant is an annual. In Kohat the frost sets in too early and is too severe for the district ever to become a good Cotton-growing country, and there is nearly as much brought into Kohat as is taken out of it: the export of the whole division goes into Affghanistan.

The Commissioner notices the experiments made at Delhi by Mr. Berkley, and at Umritsur by Mr. Cope: he thinks that "there cannot "well be a shadow of doubt in the minds of those who know India, "that it is capable of producing Cotton of almost any degree of "excellence and to an amount fully sufficient to supply the whole of "Europe. I have no hesitation, however, in stating my conviction that "the Punjab can never compete with other parts of India, as a Cotton "exporting country, notwithstanding its great advantages in the matter "of water-carriage."

If we exclude Delhi and Hissar divisions, the rest of the province is stated to export nearly nine millions of lbs. of Cotton annually: including *them* 13,298,000 lbs., and Jullundur, which was formerly believed to import largely, is now stated to export yearly 280,000 lbs.

CENTRAL INDIA.

Central India, as a geographical term, is extremely indefinite; and so is, unfortunately, the information which we possess on the subject of the Cotton-growing capabilities of the enormous tract it may be made to include. Dr. Forbes Royle writes thus: "We know that this central

MINISTRY OF CULTURE · GOVERNMENT OF INDIA

GSL

"region forms a somewhat triangular but irregular surfaced table-"land, supported on the south-east and west by prolongations of the "Indian Ghauts, and on the north by the ranges of mountains which "stretch entirely across India from the Ganges to Guzerat. Of "the rivers of the region, some, as the Nerbudda and Taptee, flowing to "the west, fall into the Gulf of Cambay: the Sone and others join the "Ganges on the east, while the Godavery and Mahanuddi, meandering "to the south-west, flow into the Bay of Bengal." Rajputana, Malwah, Bundelkhund, and Berar, are included in the limits thus defined.

RAJPUTANA.

With regard to Rajputana we only know that Cotton used to be, and probably still is, exported from thence.

When Mr. H. Bell began to make purchases of Cotton in 1846 for an investment on the part of Government, he had recourse to the Rajput bazar south-west of Agra: the Cotton, which he procured in large quantities there (6,561 mans), was of good quality: it was subjected to transit duties equivalent to 29½ per cent. on its value, between the place of growth and Agra: the distance travelled by the different batches was on an average 150 miles, and the only means of carriage being pack oxen and buffaloes, the charges were very high; still it was thought that, taking the quality into consideration, this Cotton might be sold at least as low as the produce of the neighborhood of Agra. Mr. Bell concluded from the low price and good quality of some of this Rajput Cotton, that portions of that country must be very well suited to the growth of the crop.

In 1841,* Mr. E. J. Robinson wrote to the Secretary of the Agricultural Society from Dhunnoor, in the Bhawulpore State, of which he was Superintendent: he forwarded two parcels of Cotton grown from exotic seed presented to him by the Society in the previous year. He had sown it in July, but severe drought injured the plants; they nevertheless

---

* Agricultural Journal, Vol. I., page 35.

CSL

appeared strong and healthy: three or four, which had been grown by a fakeer, and carefully attended to, had, when he wrote, attained to above four feet in height and bore a very abundant crop: he proposed to try irrigation in the ensuing year.

The Society's Cotton Committee report on the sample. The *Mexican* Cotton had a seed "large and good, and excellently well covered "with wool: the fibre is very good, being long for a short stapled "Cotton, and very good in color, fine, flexible, and strong, indicating an excellent growth and locality;" if well cleaned, worth 5½*d.* per lb.

A sample of the same Cotton separated from the seed was found to have been so dirtied in the process, and injured in fibre, as to have lost considerably in value: worth 4¾*d.* per lb.

In 1842 Mr. Robinson sent a sample of Cotton grown from exotic seed by the Rajah of Bhawulpore: he believes that such Cotton could be extensively cultivated in the territory and would meet a ready sale in Bombay.

The Committee considered the pods very large and fine, the seeds also large and covered with a "very full volume of well grown "Cotton;" the fibre (for a short stapled variety) was thought long, strong, and fine: cleaned it would be worth 6*d.* per lb.

GWALIOR.

In 1842, Dr. Irvine, Residency Surgeon at Gwalior, sent to the Agricultural Society samples of American Cotton grown by him at that place. The seed had been sown broadcast in an open field: the crop had been very productive, each pod being three times the size of that of the common country Cotton: he believes that this kind of seed ought to be sown in drills not more than two feet apart: instead of ridges, he recommends shallow drains: he thinks that two waterings ought to be given before the rains are heavy, and three after the rains cease: under such treatment, he believes that American Cotton could be successfully grown. The only encouragement needed to ensure extensive cultivation would be to hold out a direct offer of a remunerative price.

The samples sent by Dr. Irvine had been much injured in cleaning: the Cotton Committe considered them short, curly, and rather coarse, worth from 4*d.* to 4¼*d.* per lb.*

MALWAH.

Sir R. N. C. Hamilton, Political Agent at Indore, reported on the Cotton trade of part of the province in 1848, in reply to the six questions. He gives these replies in a tabular form, for forty-two different localities, but many kinds of coin are mentioned, various weights and measures, and the general averages which I have taken can only be very rough approximations.† The results, however, stand thus:

The average price of clean Cotton in the principal bazars, during the two previous years, was from 1¼*d.* to 1½*d.* per lb.

The dealer who purchased the produce from the cultivator made a profit of from 25 to 50 per cent. Advances were not, however, generally made, but when given, the Cotton was obtained from the villagers at 10 or even 25 per cent. less. Almost all the Cotton exported from Malwah finds its way to Mirzapore, and on an average costs little less than 1*d.* per lb. in transit.

The uncertainty of the size of the biga of course vitiates all calculations of produce to area: moreover, it is not stated whether the figures given refer, in any particular case, or in every case, to clean Cotton or to seed Cotton: the largest outturn mentioned is 480 lbs. per biga, the smallest 50 lbs., and the average would be about 180 lbs.

---

* Agricultural Journal, Vol. I., page 30.

† Halee, Salim Shae, Bhopal, and Company's Rupees are spoken of, and as a guide to their value it is only stated that such a rupee is now at a discount of 9 per cent., or at a premium of 15 per cent., as the case may be. Such weights as boja and mannee are used, which vary for every village, and the biga is equally uncertain: in some cases, it is described as the space over which a mannee of seed may be sown.

CSL

As to the area under the crop, and the possibility of extending the cultivation, the same uncertainty of course prevails: besides which, the aggregate statement for the whole province is rendered useless by the frequent recurrence of instances in which no estimate of the actual or prospective crop could be made: 50,885 bigas were, however, certainly sown with Cotton, and 19,495 could be added.

Sir R. Hamilton saw at Sutwass, in Nimar, 30 miles from Indore, a large quantity of Cotton starting for Mirzapore by way of Hoshungabad. "The cost of this Cotton per *boja* of four pucka mans was Rs. 22: the "carriage came to Rs. 11; so that at Mirzapore it would have cost "Rs. 11 per cwt., or 2½*d.* per lb."

The delays which the Cotton meets in reaching the market are described as very great: "it actually takes a longer time to convey the "Cotton to a port than to rear the plant."

It is, moreover, extraordinary that Cotton grown in the south-west part of Malwah should be sent to Mirzapore. Sir R. Hamilton mentions a place to the west of Dhar, from which Cotton is so sent: its distance from Bombay, measured in a straight line along the map, is 275 miles: its distance from Mirzapore, measured in the same way, is 550 miles: and the Cotton, before it reaches the port of shipment, has to be still sent certainly more than 500 miles down the Ganges. Of the province generally, Sir R. Hamilton says: "The Cotton-growing "districts of Malwah are not 400 miles from Bombay, but two months "are consumed in accomplishing the distance; Mirzapore is, however, "resorted to, more than 400 miles distant, and itself more than 400 "miles from the sea."

Baboo Radakant Deb gave an account of the Cotton cultivation of part of Malwah:* Bhilsa seems to be the part of the country specially alluded to.

---

* Agricultural Transactions, Vol. II., page 57.

GSL

The ground selected for sowing Cotton should be moderately high and dry: the soil should have a sweet taste, that is, free on the one hand from saline or nitrous impregnation, and not, on the other, chalky and insipid. Seed should be sown in the month *Assar:* as soon as the plant is a span high, weeds should be removed and the ground hoed: in the month *Maugh* it reaches maturity: about this time the ground should again be weeded and opened up with a hoe or plough, and the plant should be also pruned: in the month *Chayte* the picking commences.

Three varieties of Cotton are known in that part of India, the *Bhagella*, the *Bhochurri*, and the *Pakhy*: of these the first is a biennial; its plants are cut down to within three or four inches of the ground and left standing: they spring up and bear well in the second year: the last two are annuals.

The price of the produce of the *Bhagella* is Rs. 10-8 per man, of the other kinds Rs. 6. The Bhagella yields six mans per biga of raw Cotton, from which one man of clean is obtained, the two other kinds produce considerably less. The seed is valuable as a food for cattle and also for making oil.

That intended for sowing should be soaked in liquid cow-dung, and then dried in the sun.

Much rain sometimes injures the crop and causes the production of very mischievous insects.

CHANDERI.

An enquiry was entered on by Captain Bayles, the Superintendent of Cotton plantations, in 1841, relative to the fine kind of Cotton used at Chanderi, which elicited some information on the subject of Malwah Cotton, and is reproduced here in continuation of that subject.

Captain Bayles applied to Mr. S. Fraser, Political Agent in Bundelkhund, for some of the seed of the fine Cotton known to be used by the Chanderi spinners.

CSL

Mr. Fraser replied that the Chanderi district grew very little Cotton, and that of the common Bundelkhund kind, and that the fine fabrics were made of Berar Cotton imported by way of Indore: this Berar, or Amraoti Cotton, is finer, longer, and softer than any grown in Bundelkhund, a fact which he attributes solely to the differences of soil and climate between the places where the crop is grown, and not to any difference between the plants themselves: the Berar Cotton sells for twice as much as that grown in the district.

"In Malwah generally the Cotton is the same as in Bundelkhund, "but is grown in a different soil: in Bundelkhund the richest soils "are selected, but in Malwah, what we in Bundelkhund call *raukur*, "a coarse gravelly soil, is used: Malwah has, however, a damp, moist "climate, and the soil is well supplied with water which may render "the inferior soil more fruitful than we find it in Bundelkhund." Of this fine Berar Cotton, only a small quantity was at that time used at Chanderi, not more than Rs 2,000 worth in the year: the demand being now for the coarser cloth, which is made of the common Bundelkhund Cotton, besides which the great beauty of the Chanderi fabrics is attributed to the skill of the weavers and spinners rather than to any particular excellence in the material they employ.

Captain Bayles seems to have applied the term *Nurma* to the fine Cotton of which he had requested Mr. Fraser to procure him the seed, for this officer, in his answer, assures him that no such Cotton is ever used at Chanderi, or indeed any where else, for weaving, nor is it ever cultivated as a crop, a few plants of it being grown every where throughout Hindustan for making Brahminical threads*: this plant grows for five or six years.

---

* I have elsewhere called attention to the fact, that no reliance can be placed on the identity of the kind of Cotton called by any particular name; this is true to a remarkable extent in the case of Nurma, which occurs every where throughout India.

CSL

Dr. Irvine, of Gwalior, was referred to on the subject, and Colonel Spiers, Resident at that place, forwarded a memorandum to Government on the Chanderi Nurma.

He says that the term is applied to the finest Cotton spun at Chanderi, by the spinners themselves, who are Mussulmans; but that the best known and common name of the variety is Berari: "the Nurma is not produced as a crop at Chanderi, but imported as "required from Cholae Muhaisore on the Nerbudda, where it is regularly cultivated."

A few years before, an attempt was made to grow this Nurma Cotton at Chanderi: it was important to produce it, if possible, near the place, because the spinners insisted on separating it from the seed themselves to avoid the injury to the fibre resulting from the ordinary process of cleaning: this rendered the carriage very expensive, as it had to be brought in seed from a great distance: in cleaning this fine Cotton, the churka is never used.

The experiment made on the possibility of growing the Nurma at Chanderi did not succeed; the produce was not equal in quality to the imported article; insects and frost both proved injurious to the plants, and the fibre adhered with excessive tenacity to the seed; the trial was abandoned, Dr. Irvine thinks prematurely; the demand for the fine quality is, however, now small, as the very expensive kinds of cloth are no longer ordered to the extent to which they formerly were; at that time there was in the Chanderi stores a supply of the Cholae Muhaisore Cotton five years old and not yet exhausted.

The Nurma Cotton is of a yellowish color, and thought very fine: it is not long in staple.

The natives themselves confess that the Cotton grown by Dr. Irvine from American seed is superior to the Nurma.

The Chanderi villagers had selected for their experiment light brown loam: after the first rain in June the ground was ploughed, then allowed to imbibe a heavy shower: the Nurma Cotton seed was then

CSL

sown, and a harrow, or "patela," passed over the ground: after a few days' rain the young plants had appeared and were weeded: subsequently hoed, after which manure was spread by the hand round the plants: weeding and hoeing were repeated at intervals during growth. The crop was nearly destroyed by a small insect, and subsequently injured by frost. The produce of this experimental cultivation could not be separated from the seed by the process usually applied to the imported Nurma Cotton, which is merely rolled over with a light wooden pin and picked by hand, but had to be cleaned in the churka like common Bundelkhund Cotton: the crop was gathered in October and November at seven or eight intervals.

The supply obtainable from the only place where Nurma Cotton will grow, being limited, when there was formerly a great demand for the article, it cost one Rupee per seer: in 1841 three seers could be had for that sum, and for several years none has been imported, as the market is already overstocked; the plant is an annual, is grown on the best Nerbudda valley Cotton soil, and is never irrigated.

These discrepant accounts were referred to Sir C. M. Wade, then Resident at Indore, and that officer, as well as Captain J. Abbott, in charge of Nimar, reported on the subject.

The Nurma Cotton is supposed to be an exotic: it is not an annual, but grows as a bush for ten or twelve years, and is never cultivated for manufactures in Malwah. There is, however, a variety of Cotton of extreme fineness, which used to be grown especially for export to Chanderi,—where alone there ever existed a demand for it,—known as *M'hali.*

M'hali is superior in fineness to all other Cotton grown in Malwah, but since the demand for it which formerly existed at Chanderi has ceased, it is no longer grown or prized, and will soon die out and be lost: it is grown in any Cotton soil, but formerly its high price commanded for it the best soils: the ground was manured with dung and

CSL

black clay from dirt heaps about villages: it was sown in the end of June, and picked about forty days later than the common Cotton crop that is, at the end of March: it never was cleaned in Nimar, but taken in the pod to Chanderi: it once used to sell 50 per cent. above the ordinary crop, but now has no special value, other coarser kinds are, indeed, generally preferred; it is sometimes irrigated, and the difference thus made in the amount of the yield is very great: it is not liable to suffer from insects, nor is it injured by frost: the yield per biga is larger for the M'hali than the ordinary Cotton, and it has this farther advantage, that from its larger pod and smaller seed, the proportion of clean to seed Cotton is considerably greater.

The cultivation of this variety was confined to the Pergunnahs Dhargaon and Kusrode, in Nimar, "I should add to the single village of Muhaiswah." He believes that the locality was selected only because it is the part of Nimar nearest to Chanderi, the only market where the M'hali Cotton was ever sold. In Nimar itself there were several very famous manufactories: at none of these was M'hali Cotton ever used. He, however, believes that its superiority is real, and that if sent to the Bombay market, its fine qualities would be appreciated.*

As regards the real Nurma, its staple is always considered superior to the common Cotton, but it is not cultivated as a crop, because being a perennial, it is very difficult to protect the plants from cattle.

He believes that the soil and climate of Malwah are well adapted to the production of exotic kinds of Cotton, far superior to any of indigenous varieties.

M'hali is said to be sometimes spoken of as Berari.

There is in Nimar abundance of fine soil, a deep clay mixed with sand and kunkur, and the rich black soil known as Regur: the natives prefer this black soil for Cotton: it requires moderate but frequent irrigation.

---

* This M'hali is palpably the same Cotton as that spoken of as Nurma, by Dr. Irvine.

CSL

BUNDELKHUND.

As we approach Bundelkhund from the Malwah side, the only place of which any record appears in reference to Cotton is Sagur: the Sagur Cotton is stated to have borne a higher price at Benares in 1790 than any other kind which reached that district by way of Mirzapore, and it still had a reputation in 1830.

Mr. McLeod, when Commissioner there, made some experiments about the year 1838, with Pernambuco and Egyptian seed: he had kept the plants of these varieties three years in the ground and found them yield good crops.

The people prefer the richest black soil for their Cotton crop: and told him that deep ploughing had the effect of making the plants run to wood and leaves, and yield little Cotton.

North of Sagur lies the country which is supposed to grow the Cotton known commercially as Bundelkhund Cotton.

In 1850 Captain Ellis, Political Agent in Bundelkhund, reported to the Governor-General's Agent at Jhansie on the Cotton cultivation in the minor native states of the northern part of that country. He included

Jhansie.
Chutterpore.
Tehrie.
Datia.
Bijawur.
Punnah.
Chirkari.
Sumptur.

The country included in these states lies south of the Jumna, and of that part of Bundelkhund already described, and forms the northern part of the great hilly area often spoken of as the plateau of Central India.

Taking the average for all these places, the price of Cotton is stated to be 2·49*d.* per lb. The cultivators generally sell the Cotton in seed, but when they clean it, seem to obtain the ordinary market price: advances are not, as a rule, given, but when made, interest at the rate of 12 per cent. is charged.

CSL

The area is spoken of in bigas, of which the equivalent is not given; but the increase which is considered probable, amounts to about one-fourth of the then extent of the cultivation.

Mr. Bushby, in forwarding the report to Government, remarks that these native states do not grow much Cotton, nor do they include very much land which is suitable to its cultivation. In Scindia's country there are some fine Cotton fields, especially in the valley of the Chumbul: some traders from Agra, Etawah, &c., had that year purchased a lac of rupees worth of Cotton in the villages of that part of the country: a great deal of Cotton is grown along the Chumbul, and its quality is so highly esteemed, that when the average price of the Cotton of this country, and of the North-West Provinces generally, was Rupees 17 per man at Mirzapore, Bagcheenee Cotton (grown on the Chumbul) sold for Rupees 20. The trade is much interfered with by the customs and transit dues which the Gwalior Durbar exacts: great exertions were subsequently made to abolish or equalize these. Mr. H. Bell had a very high opinion of some of these districts in Northern Bundelkhund: he believed that there were 950 square miles scattered about there, all well adapted to the plant.

Besides the notices already quoted on the subject of the production of this part of India, there is a report of the Cotton Committee of the Agricultural Society made in 1840* on some samples of Cotton grown at Jaloun.

The samples were described as very clean and well picked, fine and flexible, but shorter in staple than common bazar Bundelkhund Cotton: there was, besides the samples of indigenous Cotton, one grown from Peruvian seed of the third generation of acclimatization: it, too, was very well picked and clean, but rather coarse and harsh: it was, however, of fair length of staple and strong: although greatly superior to the indigenous Cotton, this specimen was considered to exhibit decided

---

* Agricultural Transactions, Vol. VIII., page 30.

CSL

degeneracy from the kind to which it belonged: as grown in Peru it is, however, always irrigated, which this was not.

Mr. Mercer, the American planter, crossed Bundelkhund on his way from the Hummeerpoor farms to Bombay: he saw as he passed along many places where he thought the soil well suited to Cotton.

He found no Cotton fields in the low country below the plateau, but he met some grown there being taken to Mirzapore in seed.

REWAH.

In Rewah all the Cotton he saw was growing on the poorest land, the plants were small and the produce of a very bad quality; between Rewah city and Myher very little seemed to be grown: the Myher Cotton which he met on the road was of excellent quality, and well cleaned and got up: near that place he found some growing: it was equal to the best Bundelkhund: the land was not rich: but the produce seemed large; and as far as he could judge from the appearance of the ripening crop, the cultivation seemed carefully managed.

NERBUDDA VALLEY.

He saw no Cotton growing about Jubbulpore, but Mr. McLeod informed him that the climate would prove well suited to the crop: after he had examined a large number of samples of Cotton from different parts of this and the adjoining districts, he was inclined to believe that the difference observable was due to the varying nature of the conditions of soil and climate, under which they had been produced, and not to any difference in the plant itself.

In the Nerbudda valley itself he saw a good deal of Cotton cultivation: the plant was small and always sharing the ground with some other crop, but the staple was better than any of the Bundelkhund Cotton he had seen, and the yield was abundant as far as he could judge by appearances.

Near Nursingpore he thought the country had all the aspect of being well suited to Cotton growing: in some villages it seemed to be

CSL

the staple crop: it looked of healthy growth and prolific: the cultivators never stir the ground about the roots of the plant, so that much rain helps with the strong sunshine to harden the earth and kill the roots, thus a moisture which, with better cultivation, would stimulate, here only retards, vegetation.

Near the villages he found some very fine Cotton fields as he proceeded: these he believed to have been manured. He was every where informed that a scarcity of rain was unknown as a source of danger to the Cotton crop, but that excessive rain sometimes proved injurious.

The people consider no ground suited for Cotton save such as lets the rain-water run off freely, and they consequently always sow on sloping places on the sides of ravines.

Altogether, from the intelligent care with which he saw the crop treated, he was led to conclude that the people would readily fall into any better modes of cultivation which would make their land pay better: they evidently do not treat the crop with the indifference which he found customary in the north of Bundelkhund.

From Hoshungabad he turned south along the Bétûl road: near Patroda, which stands close to the foot of the hills, he saw some very well cultivated Cotton fields: the seed had been sown alone, and manure had, he thought, also been used.

At Seoni, south of Jubbulpore, an experiment was tried by Mr. McLeod: he sowed some Egyptian seed rather late in the season of 1835: the seed germinated well, and the plants grew vigorously and yielded a very abundant crop: in the ensuing season the young plants were much injured by excessive rain: they grew up and flowered, but were stunted.

Some Peruvian seed, which he had obtained from the Agricultural Society, had been extensively distributed among the village headmen, but had every where failed: of some he had himself sown, only 150 seeds germinated: the plants came up, but they were sickly and unpromising.

CSL

SAGUR AND NERBUDDA TERRITORIES.

The district thus defined includes part of what is often considered as belonging to Malwah, part of Bundelkhund,* and the valley of the Nerbudda.

The northern part of the Province, Jaloun, and the ceded Pergunnahs of Gwalior, in 1848 sent their Cotton north to the marts on the Jumna, principally to Calpee, at a very trifling cost for transport. The Sagur Cotton was sent direct to Mirzapore, and cost nearly 1*d.* per lb. for carriage. The Nursingpore Cotton cost still more (over 1*d.* per lb.), and that grown in the Jubbulpore district only a little less.

For the whole of the territories the average price of clean Cotton in the marts was 1·72*d.* per lb.: it was thought that the cultivator generally sold his clean Cotton at this rate, sometimes from $\frac{1}{6}$ to $\frac{1}{27}$ less: it was not usual to cultivate under advances, but when this was done, the habit was to charge 10 or 12 per cent. interest: excluding those parts of the province which lay close to Calpee, the Cotton cost on an average 1*d.* per lb. for conveyance to the place where it was put into the boat.

A very great extension was thought possible almost every where, and the figures given are 200,464 acres under the crop, and 180,264 acres, which might be added.

BERAR.

Mr. Mercer continued his journey through Berar. He found three kinds of soil devoted to Cotton in that country: "the black *Regur* or "basaltic soil, the *Rankur*, or a grey kunkery land, and a brown "kunkery soil."

The Cotton grown on the *Regur* commands the highest price in the Amraoti market: the *Rankur* produces a small plant, yielding a harsh weak-stapled Cotton: the brown soil grows the finest looking plants, and

---

* Sagur, Jhansi, &c., spoken of above under the head of Bundelkhund, are or were part of the Sagur and Nerbudda Territories.

MINISTRY OF CULTURE · GOVERNMENT OF INDIA
No figures
GSL

the Cotton is scarcely inferior to the produce of the *Regur*. All these soils seemed to Mr. Mercer superior to the corresponding kinds of soil in the north of Bundelkhund: in one part of this country he thought Cotton was the chief crop. "There is an approach to Ameri-"can cultivation here that I have seen no where else in India. The "Cotton is planted without admixture, and is sown in rows a cubit or a "little less in width, thinned to a single stalk in a place: and the ryots "say that they plough occasionally between."

As in the Nerbudda valley, too much rain is spoken of as sometimes injurious: it had been so that year. When it came to picking the Cotton the people were always careless and slovenly: besides which they store it so badly that it necessarily becomes much spoiled by the admixture of impurities.

The Cotton is, as a rule, sold by the cultivators in seed, and is cleaned and packed by the dealers: in many of the large villages he saw it lying about in heaps exposed to the dust and showers of rain, the work-people sat round these heaps, passing the Cotton through the churka. Of the different kinds of Cotton known in the Nagpore markets he hears on all sides that the plant producing them is in every case the same: and the superiority of certain samples is due, he believes, solely to the fact that some places are in climate and soil better suited to the crop than others, and that in some it is more carefully cultivated and picked: the superiority of the Hingunghat Cotton is explained at Amraoti in this way; in spite of which he no where heard any thing to lead him to believe that any one had discovered the great advantage which might be realized from trying the seed of one locality in another.

Neither irrigation nor manure are ever employed, save sometimes the latter accidentally, as when ground is broken on which the Brinjarees have been in the habit of encamping, or where cattle have been penned at night: when this occurs the improvement in the crop is very remarkable.

GSL

As regards the introduction of American Cotton, the cultivators here, as in the Nerbudda valley, treat their Cotton crop with so much care, and find it so important, that they would quickly appreciate the advantages derivable from superior seed or methods: both in the quality of their Cotton, and in their system of agriculture, they are already far in advance of other parts of India. He believes that the introduction of gins would be a great advantage: the whole crop could now never be got ginned before the rains, and the produce had consequently to be kept, ill protected from the weather, and to its great detriment, until the following season: besides this, Cotton that can be started early in the season for Bombay, or for Mirzapore, is carried at a cheaper rate, so that the saving effected by the establishment of efficient gins would be great on all sides.

NAGPORE.

The Nagpore country forms part of the Province of Berar; it lies south of the Sautpoora range and north of Hyderabad: the country is described as varied in surface by hills and forests: there are also extensive plains: the prevailing soil is said to be the Regur, or black Cotton soil, a dark colored loam, which, when moist, forms a very tenacious mud, and when dry, a dense hard mass, splitting into irregular cubes, with wide intervening cracks: in some of the hilly portions of the district there is said to be found a soft red clay, which, as well as the Regur, is of great fertility; much of the country is highly cultivated, and the people are described as excellent agriculturists.

Several streams, navigable during a portion of the year, traverse the country: and the climate is said to be characterized by an atmosphere of considerable moisture, although the rain-fall is small.

There is believed to be a very large area of the land well suited to the Cotton crop, both that now under cultivation, and also lying waste: we have found Mr. Mercer and Mr. McLeod both accepting as probably true, the statement made by the traders that the fine quality of

Nagpore Cotton, especially of the produce of the Hingunghat district, was due to the character of the soil and climate, and not to any peculiarity of the plant there cultivated.

At one time much of the Cotton crop of Nagpore was taken eastwards to be worked up into cloth in the country of the Northern Circars: later it has found its way northwards to Mirzapore, but much is said to be sent west to Bombay, and this has been by many asserted to be the natural outlet for a staple produce intended for European consumption: some, indeed, assert that the Nagpore Cotton was diverted from this natural channel by adventitious and extraneous obstacles, raised by the vexatious exactions to which the traders were subjected by some *quasi* independent landholders, through whose villages and near whose strongholds their tracks passed.

In July 1859 Mr. Commissioner Plowden submitted to Government a memorandum on the productive resources of Nagpore, prepared by Mr. Stanbrough, a resident merchant.

Mr. Stanbrough had resided for some years in the Hingunghat and Chandah districts, which lie south of Nagpore; he there purchased and prepared Cotton for the European markets, which he sent down the Godavery in native boats for exportation.

He states that "without taking into account the present imperfect "means of communication, a very large increase in the cultivation of "Cotton in the great producing districts of Berar and Nagpore would "at present be unprofitable on account of the impossibility of pro- "curing a sufficient number of hands to clean a much larger quantity "of Cotton than is now grown. As it is, a large amount of Cotton "is spoiled, as I shall explain, and either thrown away, or fraudulently* "packed and sent to the ports, to the great loss of some of the parties "engaged, and with the effect of discrediting and depreciating East

---

* That is to say unginned Cotton is fraudulently mixed by the dealers with the cleaned Cotton sent to the export marts.

GSL

"Indian Cotton in general. The uncleaned Cotton cannot be sent at "a profit to the ports on account of its great bulk and weight, only "one-third being Cotton, and two-thirds seed and refuse. Although "the process of cleaning Cotton, either by the native or European "machine, is not one requiring great skill, still some practice and care "are required, and it cannot be carried on by agricultural laborers, in "addition to their ordinary work.

"Cleaning Cotton by the native method costs about five pice or an "anna and a quarter per man of twelve seers, (or about 23 lbs.,) and "one person cannot clean on an average more than one such man "per day. Women and children principally do this work in Berar "and Nagpore, using the native churka, formed by two rollers revolving "on each other, and about one and a half inches in diameter: although "some have one roller of wood and the other of iron of less diameter, "as used in the Upper Provinces.

"To show the difficulty of increasing the quantity of marketable "Cotton, from the above cause, and from another, namely, the necessity "of a change of crops for two years on the ground on which Cotton "has been grown, and of fresh ground every year for the Cotton crop, "I may mention that, in 1856, Cotton was sold at Nagpore at 1¾*d.* per "lb., and 180 millions of lbs. were exported from Bombay. In 1857 it "had risen to 2½*d.*: an immensely increased breadth of land was "planted with Cotton, and the exportation in that year rose to upwards "of 250 millions of lbs. Then came the reaction: the cultivators could "not reduce the breadth of land sown with wheat and cereals beyond "a certain minimum, or, owing to the uncertain means of communica"tion, they would have risked incurring a famine in their own district, "and not having capital or cattle (which amount to the same thing) to "take up and clear new land, the cultivation of Cotton fell off, notwith"standing the rising price, to an immense extent: in 1857 the price "was, I have said, 2½*d.*, and the export 250 millions of lbs.: in 1858

GSL

“ the price had risen to 3$\frac{1}{8}$*d.* per lb., and the export fell to 145 millions of lbs., literally because there was no Cotton in the districts.

“ Besides the bad effects of the hasty and imperfect manner in which Cotton is now cleaned by the natives in these districts, the growers are compelled, from insufficiency of labor, to leave a very large proportion of their Cotton on the plants unpicked, in their anxiety to get a high price by being early in the market, the first Cotton of the season being, of course, most certain to sell at a higher rate. They therefore begin by picking as much Cotton as they can put under cover and clean by members of their own family. In the meantime a great part of the pods remaining on the plants, falling to the ground, when the Cotton becomes spoiled by dust, and by particles of the withered or fallen corolla or flower, which also, if the picking is long delayed, are blown about and become so mixed and cohesive with the Cotton in the pods, that no subsequent effort at cleaning can extract them without the loss of 20 or 30 per cent. of the Cotton; so that the Cotton which has been in this way deteriorated by a mixture of dirt and the withered flowers is almost unsaleable.”

Mr. Stanbrough recommends “ brush gins,” the American saw gin having been proved to injure the staple of Indian Cotton, which it tears and shortens. He praises the brush gin: it is, he says, capable of cleaning six mans (of 23 lbs.) in a day, can be worked by children, and does not hurt the fibre. It would, he thinks, be easily introduced in Nagpore, and be a great advantage to the people at large.

On the subject of irrigation he says that his own experience has clearly proved to him that however, in certain places, water may be either not needed by, or even injurious to the plant, it is, when judiciously applied, competent to greatly increase the quantity of the yield, and at the same time improves its quality. The best Cotton in Nagpore is grown near the Kurda River and its confluent, the Wuma, which rises north of Hingunghat, and the quality deteriorates in proportion to

W

CSL

the distance of the field from the moistening effect which proximity to the river has on the soil.

"I myself tried an experiment upon a field of a little more than "8 acres: the ploughing and sowing were conducted in the ordi-"nary local fashion, but as soon as the flower made its appearance I "commenced watering every evening, obtaining the water from the "river by coolies. Although my field was surrounded by others sown "with the same seed, my plants were nearly as big as currant bushes, "produced nearly three times the usual quantity of Cotton, and the "staple was equally fine but considerably longer than the common "crop,—in fact, nearly as long as the best Sea Island Cotton, which "fetches the highest price in the English market. The natives always "look with great anxiety for rain when the flower buds begin to open."

The Deputy Commissioner of Raepore states that the soil on which Cotton is commonly grown in his district is black, porous, and very fertile.

The Raepore district lies in the water-shed of the Mahanuddi; its surface is undulating, it is intersected by many streams, and a red gravelly soil abounds as well as the black Cotton soil above described.

The ground is prepared for the Cotton crop by five or six ploughings, the seeds are mixed with moistened cow-dung, allowed to dry, and then sown broad-cast. The sowing takes place in July, the ground is weeded three times during the growth of the plant, which flowers in September: the pod ripens in October and the Cotton is picked from that time till the end of December: one-fourth of the weight of the raw produce is obtained as clean Cotton. Manure is never used. The crop occasionally suffers from heavy rain in September, which, besides injuring the flowers, subjects the plant to the ravages of insects.

Mr. Williams, of Jubbulpore,* considers the Raepore Cotton to have "a good, strong, coarse fibre, admirably adapted for coarse cloths,

---

* Late overseer of the "School of Industry."

GSL

and would answer for the finer textures if gathered with more care." It is, he thinks, the extraneous matter mixed with the fibre, and not its deficiency in natural good qualities, which renders it now unfit for the finest fabrics.

The Deputy Commissioner of Nagpore states that the soil on which by far the greatest quantity of Cotton in this province is grown is that known all over India as black Cotton soil. It is extremely light and naturally rich, requires very little manure, and as a rule gets none. The poorer kind of soil in which Cotton is sometimes grown is a mixture of this with greyish earth, and if situated near a village this is sometimes manured.

The Cotton is sown in the commencement of the rains, immediately after the first fall: from the middle of June to the middle of July, according to the season: it is occasionally sown in alternate rows with another crop, but mostly by itself: irrigation never is employed: a plough is run between the drills to throw the earth over the roots of the plants when they are a few inches high: the plants flower in October, picking commences in December, and continues down to the middle of the following March: one-fourth of the produce is clean Cotton.

In 1861 Major Elliot addressed Government on the subject of Cotton-growing in Nagpore; a large quantity was, he said, grown in the Province, and this quantity could, he thought, be easily increased. "Hitherto the trade may have been retarded in consequence of the "difficulties of transport from bad roads or rather no roads at all, and "from the transit duties of the old native Government, continued, until "very lately, under our rule."*

They have been abolished, and the roads improved: of the five districts into which the province is divided, namely, Chindwarra, Bhundarra,

---

* These were not apparently levied by Government, but by Jagirdars, with whose traditional vested rights it was not considered advisable to interfere.

Nagpore, Chandah and Raepore, the first two produce little or no Cotton.

The annual crop is estimated to amount to 20 millions of lbs., of which about 9 millions are the produce of the Nagpore district: although the Raepore district grows Cotton largely, it is said to be of a coarse description*: it is exported to the east, and is supposed to be either consumed within the territory or absorbed by the districts lying between it and the sea: the growth of the Nagpore and Chanda districts is sent either to Bombay or Mirzapore.

Major Elliot recommends the construction of certain roads, and states his belief that any required quantity of Cotton can be procured from Nagpore and the adjoining districts.

Mr. A. Ross states that only certain parts of the Nagpore district grow Cotton, namely, the pergunnahs lying on the southern and western side of it: in some of these the country is flat, in others hilly: in the whole district there are 281,214 acres under the crop (in 1861), and he estimates that the average yield is 30 lbs. of clean Cotton per acre, at which rate Nagpore alone (exclusive, that is to say, of Chanda, Raepore, &c.,) produced a quantity equal to one-thirtieth of the total export from India to Great Britain in 1859-60: the Cotton cultivation is nevertheless capable of very great extension.

He adds some calculations of the price and cost of transport.

The price at Hingunghat has, he says, this year risen from Rupees 27 to Rupees 35 per load of 268 lbs., the cost of conveying the Cotton to Bombay has also risen in the proportion of 42 to 24.

The average price of Nagpore Cotton at Bombay is stated to be 4⅛*d.* per lb.†

---

* See ante Mr. Williams' opinion.

† If 268 lbs. cost Rupees 35 (that is, 3·14*d.* per lb.) at Hingunghat, and that its price at Bombay was 4⅛*d.* per lb., the cost of transport may be taken as 1*d.* per lb.

On the 10th December 1861 the Judicial Commissioner in charge of the Commissioner's office at Nagpore furnished Government with the following information* :—

RAEPORE.

The Deputy Commissioner states that there are two descriptions of Cotton grown in Chutteesgurh, the *Chiktee* and the *Wulah*, both of which are annuals: the former will grow on any soil that is met with in the district, as well as in any situation, provided the ground be well drained, but it flourishes best on a red porous soil.

After the ground has been prepared by two ploughings, the seed is sown broad-cast in June and July; manure is never used, and other things are grown on the same ground with the Cotton. After the plant has attained the height of a few inches the earth about it is dug, and during the progress of the crop to maturity, the field is thrice weeded; the seed of this Cotton is black. The Cotton is picked between the end of October and the end of December, after which the plant withers, and the ground is, during the succeeding year, used for some other crop, or let lie fallow.

A light rainy season suits this Cotton best, excessive wet killing the plant. The average yield is 800 lbs. of seed Cotton per acre, from which 200 lbs. of clean is obtained. The cost of cultivation is as follows per acre :—

Rent of ground	Rs.	3	12	0
Seed...	„	0	12	6
Ploughing, digging, weeding, &c.... ...	„	2	7	6
Picking	„	0	10	0
Paid labor, when it is required, adds to the above items	„	5	0	0
	Rs.	12	10	0

It is obvious that there is a material difference in at least the apparent cost if the grower can do without hired labor.

---

* When these reports reached the Compiler the previous pages were in the press.

CSL

The *Chiktee* Cotton is grown both for local consumption and export, and forms the staple crop of several pergunnahs of the district.

The *Wulah* variety requires the black soil, "the situation should be open and the field have a gentle slope." Ground for this crop is ploughed four times during the rains, and the seed is sown broad-cast at the end of September : manure is never used, and the castor-oil plant is often grown on the same ground with this Cotton ; when the plant is six inches high the earth about its roots is dug and ridged, and the field weeded: the seed of this Cotton is green: the Cotton is picked in March and April as it ripens: after bearing, the plant withers, and the ground either lies fallow next season or is sown with wheat. The return is largest after a heavy rainy season, and much benefit is derived from showers in January and February. Artificial irrigation has been found injurious even in the driest seasons,* and excessive cold has an unfavorable effect: the average yield per acre is 600 lbs. of raw, or 150 lbs. of clean Cotton. The cost of cultivation per acre is as follows :—

Rent of land...	Rs.	3	12	0
Seed	„	1	9	0
Ploughing, weeding, and digging	„	2	14	0
Picking	„	0	10	0
Hired labor, when necessary, adds to the above	„	4	11	0
	Rs.	13	8	0

This variety is grown solely for local consumption : it is "cleaner, whiter, finer, softer, and heavier than the *Chiktee*, and works into a far better thread," he thinks it is better adapted to the home market, but then it only grows on one kind of soil and requires more care in its culture, while, at the same time, it gives smaller returns. Both kinds he thinks capable of improvement, both in quality and quantity of yield, and the opposite conditions above described as favorable to each renders the success of one or other in any given year a matter of certainty.

---

* This seems universally the case on the black Cotton soil.

The *Chiktee* sells for 10 lbs. per Rupee, the *Wulah* 8 lbs. per Rupee (2·40*d.* and 3*d.* per lb. respectively).

The quantity of land under Cotton at present (October 1861) in Chutteesgurh is 183,750 acres, "producing in an average season 36,750,000 lbs. of clean Cotton, worth on the spot Rupees 36,75,000; of this 35,000,000 lbs. are consumed in the district, and 1,750,000 exported": it goes eastwards, but much of it is supposed to be absorbed before reaching the coast: both carts and bullocks are used for its transport, chiefly, however, the latter: all that reaches Sonepore on the Mahanuddi is there placed in boats. During the rains a considerable quantity can be conveyed out of the district in boats, on the upper tributaries of the Mahanuddi.

The Brinjarees trade between this and the eastern coast, taking down Cotton and wheat and bringing back salt.

When carts are used as far as Sonepore the expense of transport averages 9 per cent. on the prime cost; when the Brinjarees take the Cotton to the east, on their bullocks, he thinks the cost of carriage must come to 50 per cent. on the original value.

In the current year there was 25 per cent. more land sown with *Chiktee* than usual, but in consequence of the great quantity of rain the aggregate of the crop will scarcely equal an average one.

Thirty per cent. was added to the area of the *Wulah* crop, which, it is expected, will be particularly abundant.

The Deputy Commissioner states that "after careful comparison of the data" at his command, he estimates the quantity of land fit for growing Cotton in Chutteesgurh at 16 millions of acres, supposing it cleared of jungul and sufficient labor available for cultivating it: "this area, after allowing for half the land being fallow annually, would grow 16 thousand millions lbs.* of clean Cotton a year." It must, however, be remembered that the population is small and scattered, food is extraordinarily cheap, and the people, who, he says, are "but one grade above savages," require nothing save salt and jewellery that cannot be produced in their own villages. The Cotton crop requires more care in the cultivation than any other, save only sugar-cane, and only so much is grown as will supply the actual necessities of the cultivators.

The zemindars would extend the cultivation were it more profitable than that of wheat; he recommends that some of them be supplied with good exotic seed, and that cleaning and packing machinery be established at stations in the district. He further discusses the improvement of the roads and of the navigation of the Mahanuddi.

The Judicial Commissioner remarks, "The report furnished by the "Deputy Commissioner of Raepore gives, in my opinion, a very "exaggerated idea of the quantity and value of the Cotton at present "produced, or which might be produced, in that district."

NAGPORE.

The Deputy Commissioner of Nagpore states that the bulk of the Cotton grown in his district has hitherto been exported to Mirzapore. Last year (1860-61) the crop was a moderate one, the whole quantity produced having been under 40,000 bales; of this about 10,000 bales were sold in the Nagpore and Bhundara districts for manufacturing purposes; 15,000 bales were exported to Bombay by way of Amraoti; about 6,000 bales were sent to Mirzapore, and the remainder is still in store in the principal local marts. In ordinary years the crop may be estimated at 50,000 bales, but it is difficult to say how much is annually sent to Mirzapore or to Bombay, as the state of the market in these places regulates the supply, but the former place usually attracts a larger

---

* That is at the rate of 2,000 lbs. of clean Cotton per acre: an additional cypher has evidently been accidentally added, for 200 lbs. is above given as the produce per acre.

CSL

quantity than the latter. The crop is invariably sown at the commencement of the rains, from the 15th to the close of June, and picking commences about the middle of November and lasts about three months. The plant is an annual.

The current year's crop is likely to be considerably below the average, owing to the long-continued rains: it will probably not exceed 20,000 bales. The extent of land under Cotton in the district is given in the Revenue Survey records as 281,214 acres, but much of this is shared by the Cotton with other crops sown in the same field. There is a very much greater area suited to the crop, but the Deputy Commissioner doubts if any great quantity could be withdrawn from the crops now grown, especially from the food staples. The general average yield is stated to be 20 lbs. per acre,* but in some seasons it would run as high as 25 lbs.

The produce is exported on bullocks and carts: the price is given as Rupees 3 per man, the extremes being Rupees 1-8 and Rupees 4.†

CHANDAH.

The Deputy Commissioner of Chandah reports that there are two kinds of Cotton sown, the *Bunnee* and the *Jirree:* the former is sown in June and picked in November, the latter is sown in September and picked in March. The total amount produced in the district is estimated at 14,400 mans (of 80 lbs.) of which 6,900 mans are used in the district and 7,500 mans exported to Hingunghat and Mirzapore.

The quantity of land capable of being devoted to Cotton-growing is roughly estimated at 123,000 acres, but only half of this could be under the crop in any one year, besides much of it is required for the grain crops.

---

* One-tenth of that stated for Raepore.

† The man is not the standard man, and the price given in the text is equal to 3·42*d.* per lb.

GSL

About a lac of Rupees worth of cloth manufactured at and near the town of Chandah is annually exported to Amroati and to places beyond it, and about Rupees 50,000 worth of cloth made within the district of Chandah is annually sent to Hingunghat and other places.

CHINDWARRA.

The Deputy Commissioner states that Mohgaon is the only place within his district whence Cotton is ever exported, and that the greater portion of this does not find its way beyond Nagpore: only about 1,000 mans being exported to Mirzapore. The times for sowing and picking are the same as in Nagpore, and about 10,000 acres of arable land, now applied to other purposes, might be devoted to Cotton cultivation in addition to 8,682 acres now under the crop.

BHUNDARRA.

In this district the cultivation of Cotton is almost unknown, although there is plenty of land well suited to the crop.

GODAVERY DISTRICTS.

The quantity of Cotton now produced in these districts is too trifling to call for direct notice, but the Deputy Commissioner reports that there is a great quantity of land well suited to the cultivation. None is exported, and some is imported into the Bustar district. The usual season for sowing is from the 1st to the 15th October, and picking commences early in January and ends in March.

With regard to the cost of transport, the Judicial Commissioner obtained from Mr. Stanbrough, on the accuracy of whose information he places the fullest reliance, the following statement:—

The average cost of the carriage of a *boja* of Cotton, weighing 262 lbs., to Bombay, is Rupees 9, and to Mirzapore, Rupees 10.

This year an exceptional demand for carriage, due to the activity of the Public Works Department, and to the railway works, has increased the above rate by Rupees 2.

Finally, the Commissioner believes that a well-managed agency for the purchase of Cotton could greatly extend the area of its cultivation and at the same time its quality.

HYDERABAD.*

The territories of the Nizam of Hyderabad occupy the centre of the peninsula to the south of Nagpore.

In physical aspect it is said to resemble that country, its surface being formed of rocky hills, undulating grounds, and flat valleys drained and watered by many fine streams: the soil is described as generally productive and occasionally of great fertility: the northern part of the country lies in the water-shed of the Godavery, the southern part in that of the Kistna: as was the case in Nagpore, part of the ground is occupied by the well-known Regur or black Cotton soil, and part by red clays often sandy.

Of the northern part of the country bordering on Candeish, Dr. Royle says,† "It consists of an alluvial soil, of great depth, more intersected by "rivers than any part of India, Bengal Proper excepted: the ramifica-"tions of the streams in this valley are most astonishing; there is no "part of India so well irrigated, and it is admirably adapted for the "cultivation of Cotton. With regard to this part of the country, "between the Pynegunga (a confluent of the Wurda, which is a

---

* With regard to Nagpore and Hyderabad, the Compiler thought that they might well have been omitted from this work: it is obvious that however political considerations may have brought them into connection with the seat of the Supreme Government, they have physically nothing to do with Bengal: and although the action of certain causes before alluded to, long sent the Cotton crop of much of the central part of the peninsula, north to Mirzapore, and diverted it from its natural channel of exit, the removal of those causes will, if a demand arises, in future permit the Cotton to find its way to the nearest port, facilities of transport and price alone determining whether it shall pass to the east or to the west. Such considerations were, however, overruled by distinct instructions to include all available information on the subject.

† Culture, &c., of Cotton, page 324.

CSL

"tributary of the Godavery) and the Godavery itself, there is this "advantage in dry cultivation, that after the seed is once in the "ground, the dew is quite sufficient to mature the crop without "any rain whatever, so that you find the dry cultivated tracts in a "state of the greatest prosperity, while you see the wet or rice cultiva- "tion starving for want of water."

As to the Cotton crop generally, it seems, like that of Nagpore, to be decidedly superior in natural characters, length, strength, and fineness, &c., of staple, to the average, at least, of Bengal Cotton, but nowhere are the extraneous defects more fatal to the commercial value of the produce than here.

In 1848 Colonel Low, Resident at Hyderabad, collected and forwarded to Government in reply to the six questions, some information on the subject of the Cotton cultivation and trade of the territories.

The Nizam's minister stated that in the northern portion of Hyderabad (Berar) the general average price of clean Cotton was 1·9*d.* per lb.: ranging from 1·4*d.* in ordinary, to 2·4*d.* per lb. in dear years: he states that from one-half to three-fourths of the raw produce is the weight of the cleaned Cotton: there is probably some mistake in this answer.

The value of the Cotton seed here as elsewhere pays for the cleaning process. With regard to cost of transport to Bombay this officer says, "From the principal marts of Khamgaum and Amraoti the Cotton is "conveyed to the bunders of Panwell and Carselis, in the Bombay Pre- "sidency, at a hire of four or five Hyderabad Rupees per pullah "(0·34*d.* per lb.) from the former, and at six or seven per pullah from "the latter (0·52*d.* per lb.). In addition to which a charge of twelve "annas to one Hyderabad Rupee per pullah is incurred in packing the "Cotton, independent of the transit duties, within his Highness' terri- "tories, charged at several stations of the Sircar, and other stations "belonging to Jagirdars, and the right of Moocudums, and the

CSL

"watcher at night, &c., which all amount to one and a half Hyderabad "Rupee per pullah (0·12*d.* per lb.), exclusive of customs charged in the "Bombay Presidency."

Pestonjee Viccajee states the prices in the northern marts to be precisely the same as above given, and repeats pretty closely the minister's statements.

Captain Fenwick of the Nizam's service gives the same price for West Berar, but adds that since 1840 he has known it as low as 1·28*d.* and as high as 2·4*d.* The cost of transport fluctuates; he had himself paid as little as 2¾ Rupees and as much as 12½ Rupees per pullah, the average being about 7 Rupees per pullah or 0·56*d.* per lb.

He states that in 1824-25 only 2,000 pullahs of Berar Cotton were despatched to Bombay, and that in 1841 120,000 pullahs, or 28,800,000 lbs. had been sent: besides all which had been exported to Mirzapore.

Captain Dorin states the general average of the Berar marts for clean Cotton to be 1·6*d.* per lb.

"The reason that a large quantity of Cotton is exported to Mirza-"pore in preference to Bombay, though the land journey is much "longer, is to avoid the extremely heavy and arbitrary duties levied "upon it in the Nizam's territories."

The cultivator sells his Cotton (generally uncleaned) at about a Rupee below the market rate. "An advance is always made,* and "from this arises one of the great evils of the Cotton trade. The "money having been advanced by purchasers who take the Cotton in "large quantities for exportation, they are obliged to accept whatever "produce is brought to them, or lose their money: and the maha-"juns (small traders) who are the principal cleaners of the Cotton, and "the ryots who cultivate it, knowing this, mix with the clean and good "Cotton all sorts of rubbish, and the bad or inferior Cotton of last

---

* First by the great merchants to the small dealers, and then by the latter to the growers.

GSL

"year, which admixture can never be again entirely separated. The "cultivators again, when they have received advances, are frequently "not allowed to gather the Cotton in small quantities as the pods "ripen, but are obliged to wait until the crops have been assessed, "and by this time much of the Cotton is frequently spoiled by "the pods falling off, and dry leaves, &c., getting mixed with "them."

The cost of transport, whether to Bombay or to Mirzapore, is said to vary greatly according to a great number of accidental circumstances, the time of the year, the kind of season it happens to be, the price of food, &c.

He believed that the cultivation was then on the decline.

Captain Meadows Taylor, of Shorapore, reported that there was no great Cotton mart in the district, but that dealers travelled about buying up the crop from the cultivators at an average rate of 1·6*d.* per lb. : it would appear, however, that this is rather the cost of the article to the purchaser and includes expense of collecting, &c., the grower receiving somewhat less, when he sells the Cotton in seed: the trader cleans it. Twenty mans are said to yield thirteen and a half mans of seed (worth Rupees 2-8) and six and a half mans of clean Cotton, the cost of cleaning being Rupees 1-9-6: considerably less than the value of the seed.

The villager, when he can, always cleans his Cotton : Captain Taylor believes that much is laid by in order to gain the advantage obtained by cleaning it at home: much is even spun into yarn: when the villagers use paid labor for cleaning the Cotton, two-thirds of the seed is given for the work.

The nearest port of shipment is Rajapore in the Concan, to which some Cotton is sent, at a cost of 0·7*d.* per lb. Several different places to which the Cotton is sometimes sent for sale are mentioned as well as the cost of internal traffic.

The district did not contain much, although there was some waste land: a considerable extension of the crop would be effected by an increase in price; what between the waste land that might be brought under cultivation, and the crops which might be superseded, he thought an increase of from 30 to 50 per cent. on the present area possible.

He states that a large quantity of Cotton is annually grown in the water-shed of the Kistna: the Raichore Cotton is sent to the east and north-east and absorbed by the districts in those directions where the crop is not cultivated. The Cotton grown farther south goes to Coompta on the coast by way of Bellari and Dharwar, and, with the produce of these districts, is known as Coompta Cotton in the Bombay market.

Captain Taylor had made several attempts to introduce exotic Cotton into Sumurthan (Shorapore); the Bourbon and New Orleans seed both seemed to succeed well on "the limestone soil," but in the year of his first experiment there happened a total failure of the Cotton crop in that part of the country.

"Last year (that is, in 1847) I tried small portions both of "Bourbon and New Orleans Cotton in red gravelly soil, sowing "them at the very commencement of the monsoon, and the result was "more complete than I could have expected. The plants grew to a "height of upwards of 6 feet: the branches spreading laterally about "3 feet from the stem, they were vigorous and healthy, and the "branches weighed down by pods and leaves: the produce both in "amount and quality far surpassed any that had been grown in the "black soils or at a later period of the monsoon." He intended to have 100 bigas under the crop from the seeds of this first sowing.

So long, however, as these districts are dependent on their present means of transport, no improvement in the quality or increase in the quantity of the crop will be of any avail in establishing a great trade.

CSL

In 1855 Dr. Riddell, writing from Bolarum (Hyderabad), sent samples of Cotton grown there to the Agricultural Society.*

The Cotton Committee reported that one sample was raised from probably New Orleans seed; it was pronounced to be of good color, fine, soft, and pliant, but weak in staple, valued at 4*d.* per lb. A second sample was probably of the Bourbon variety, the fibre was long, soft, and silky, like Sea Island Cotton, but not equal to this last in strength and complexion: it was thought a very superior Cotton, and valued at 18*d.* to 21*d.* per lb.

The third sample was of Berar Cotton: it was a good specimen of a native Cotton; the staple was pretty long and was free from the harshness of feel and want of pliancy so common in the Cotton of the country: worth 3½*d.* per lb.

In 1855 Mr. G. A. Bushby sowed some exotic seed at Hyderabad, which, he thought, was of the New Orleans kind: it turned out, however, to be Sea Island: the seed was set early in June, in rows 2 feet apart, each seed being also 2 feet from the next one: one and a half lbs. thus covered a biga of land: the yield per biga was 325 lbs. of seed Cotton, from which 81 lbs. of clean was obtained: irrigation was not considered necessary save under exceptional circumstances.

Comparing the produce of this crop with that of the ordinary indigenous kinds, he found that its fibre was far longer and finer, the seed larger and heavier, and easily separable from the wool, whereas the common kind was very adhesive.

The proportion, however, of clean to seed Cotton in the native kinds is said to be one-half,† whereas in this Cotton it is only one-fourth:

---

* Agricultural Journal, Vol. IX., page 116.

† The only other place where I have ever met a statement to the effect that 50 per cent. of clean Cotton is obtained from the raw produce, also refers to Hyderabad.—See ante, page 272.

CSL

notwithstanding which disadvantage, the great productiveness of the exotic plant still leaves its yield of clean Cotton per acre higher than that of the other.

In May 1856 Mr. W. Blundell, of Calcutta, examined the samples forwarded.

He pronounced it to be Sea Island, and not New Orleans Cotton: the different parcels were all of fine quality, clean, and long-stapled, they ranged in value from 10*d.* to 24*d.* per lb.

In 1858-59 Colonel Davidson states in his administration report that he had been addressed by the Manchester Chamber of Commerce on the subject of the Hyderabad Cotton trade. A supply of American seed had been sent to him, but it unfortunately arrived too late for the sowing season: much of it was spoiled, and little germinated: he thought there was a fair prospect of introducing an exotic Cotton when the seed sent should be in good condition and arrive at a proper season.

In 1859-60 the same officer reports that he had received ten gins from the Manchester Cotton Supply Association: these he had distributed gratuitously, but the people would not use them: he proposed to make a trial with them at the cost of Government. He had also received from the same source 3,900 lbs. of New Orleans Cotton seed, which he had also distributed.

In 1860-61 he reports that the seed received in the preceding year had nowhere germinated.

In 1860 Colonel Davidson reported in detail to Government the results of his late experiments.

He regrets that those tried on exotic seed up to that date must be considered as having failed.

In regard to the gins, he believes that their not being appreciated by the natives, is to be attributed to their having failed to adjust or use them properly.

CSL

First experiment.

On the 26th December 1857, a supply of seed was received in Hyderabad, and distributed on the 4th January following, to the Deputy Commissioners of the Hyderabad assigned districts: this consisted of fourteen cases of Egyptian Cotton seed forwarded by the Secretary to the Bengal Chamber of Commerce.

In East Berar the seed of this batch was tried in a garden at Nursee, but the plants, although irrigated, withered away a few days after they had sprung up. A portion was also tried in the garden of the Deputy Commissioner at Hingoolee: but it too failed: only one or two seeds germinated, and these soon died off: other trials were made with the same result.

In West Berar the result of trials made was the same.

In the Dharaseo district the seed distributed among the villages, wherever it germinated, died off as above: but that tried by the Deputy Commissioner was more successful: about three-tenths of an acre was sown, it came up very irregularly, but the plants which grew were very healthy: the plot yielded 31 lbs. of clean Cotton, or about 100 lbs. per acre, which would, of course, have been more had all the seed germinated: the soil in this case was described as a deep rich alluvium, and it had been well manured: half of the plot of ground was several times watered during the growth of the plants, but there did not appear to be any difference in the yield of this part as compared with the rest of the field which had not been irrigated: the proportion of seed to clean Cotton was two to one.

The plants were left standing and the produce of the second season promised to be larger than that of the first: some of the seed obtained from the first crop (that of 1858) was sown at the beginning of the monsoon of 1859 and all germinated: a sample was sent.

In the Raichore Doab the experiment had been as unsuccessful as in the first-mentioned districts.

GSL

Second experiment.

On the 9th March 1859 the next supply reached Hyderabad, and on the 11th of the same month was sent out into the districts: it consisted of four and a half bags of Egyptian and one of Brazilian Cotton seed, forwarded by the Superintendent of Marine, from Calcutta.

In East Berar this seed was sown at the commencement of the monsoon; different kinds of soil had been carefully prepared in different places for its reception. Long breaks in the rains occurred this year, and the whole Cotton crop was a bad one in the district.

The Brazilian seed germinated, and the plants grew well and looked healthy, until they were six inches high: when they became blighted and withered away.

The Egyptian seed did not all germinate, but the plants which came up flourished: some of them were strong and healthy and bore large pods: the produce was certainly superior to that of the common kinds, but the crop would require greater attention than is paid to the native Cotton.

The seed obtained was reserved for a further trial, and a sample was sent.

In West Berar the experiment was an utter failure: none of either kind of seed germinated.

In the Dharaseo district the failure was equally complete.

In the Raichore Doab the Egyptian seed grew well: the Brazilian seed is not mentioned in the report: of the crop yielded by the former kind a large supply was expected to be saved for the sowing season of 1860: the produce was of fine quality and the plants prolific: the Deputy Commissioner found that on the black Cotton soil this variety succeeded better than the New Orleans: it yielded one-fourth of ginned Cotton from the gross out-turn. These experiments the Commissioner remarks are the result of a careful and costly culture, and should not be hastily generalized, or interpreted as affording a trustworthy index to the possibility of introducing the exotic Cotton to general cultivation.

CSL

Third experiment.

In March 1858, at the suggestion of Captain Meadows Taylor, then Deputy Commissioner of West Berar, the Commissioner of the Hyderabad assigned districts recommended the purchase of 10,000 lbs. of Dharwar-grown New Orleans Cotton seed. This supply was not received in the district until September, which was too late for a fair trial.

A small quantity was, however, distributed among the Tehsildars of West Berar.

This was sown in each of the two kinds of soil used for the indigenous Cotton: in seven or eight days the plants sprung up and in three months bore three or four pods each: but after the first picking they withered away and the produce was not more than one-third of what the native crop yields: the people of the district say that their black soil is not suited to the exotic Cotton.

Fourth experiment.

In May 1859 a supply of 3,900 lbs. of New Orleans seed reached Hyderabad, which had been forwarded by the Manchester Cotton Supply Association along with ten "Macarthy's Cotton gins."

In East Berar none of this seed germinated.

In West Berar it all likewise failed.

In Dharaseo district the seed was sown in a garden at Nuldroog, a very small proportion germinated, and the plants which came up were stunted and produced little.

In the Raichore Doab none of this batch of seed germinated: New Orleans Cotton is already known and cultivated in this district by the villagers: they obtained the seed from Dharwar and are paid 5 Rupees per candy* more for the produce than for that of the common crop.

Of the ten gins, three were sent to each of the Berar districts, two to the Raichore Doab, and two to Dharaseo.

---

* Equal to 784 lbs.

CSL

In East Berar considerable difficulty was experienced in getting this machine into gear, and when set to work it frequently got jammed: and the Cotton passed through it was so torn and spoiled as to be greatly deteriorated in value.

In West Berar no trial was made, as it was found impossible to adjust the machines.

In the Raichore Doab the gins have been successful, and the Deputy Commissioner says that the two received by him have been so readily taken to by the natives that they are unequal to the work, and a further supply is asked for.

Besides the above experiments, Captain Meadows Taylor recorded the results of a trial made by him in 1859, in the Shorapore district, with New Orleans seed obtained from Dharwar.

He tried a different soil and a different season for sowing, from the soil and season usual in Dharwar, and had obtained a larger out-turn, and a superior Cotton.

In Dharwar the black Cotton soil is exclusively used, and the seed is sown in September. Captain Taylor sowed in June on a sandy red granitic soil, and neither applied manure nor irrigation; the rain-fall that season was unusually scanty, in spite of which his crop was healthy and prolific.

The Cotton was picked as it ripened, but was not otherwise exceptionally treated, and the produce was cleaned by the common churka. Should it be practicable to grow this crop on a large scale on this soil, the result would, he thought, be of great importance in Shorapore, where Cotton sowing is now limited to the rich lands, and where considerable areas of the poorer soil he successfully tried, exist.

Samples of his Cotton were submitted to merchants of experience in Bombay, who reported that it was "all that could be desired by those "interested in promoting the cultivation of good Cotton in India,—any "quantity of this quality would find a ready sale in Liverpool at the full "rates of fair Orleans, at present 7¾*d.* to 8*d.* per lb.; we are inclined to "believe that the mode of culture adopted by you is peculiarly suited to "this description of seed, no sample of New Orleans growth in this "country having been seen here equal to yours."

Captain Taylor, under the encouragement of this success, purposed to select his site more carefully next season, and prosecute the experiment. Colonel Davidson forwarded the following samples* :—

1*st.*—Of the first crop (raised in Dharaseo district) from the Egyptian seed received in January 1858.

2*nd.*—Of the crop raised from the seed obtained from the above picked in 1859.

3*rd.*—Of the produce of the New Orleans seed received from the Manchester Cotton Supply Association in May 1859.

These were submitted by the Secretary to Government to the Agricultural Society's Cotton Committee, who reported that

No. 1—Was mixed with some woolly-looking fibre, unlike the Cotton itself, which rendered it impossible fairly to value it. When separated from this, the staple was long, soft, and silky: the color had been injured by damp: if free from the adulteration mentioned, this Cotton would be worth as much as the best Egyptian Cotton.

No. 2—Was also mixed with impurities, badly picked, and ill cleaned, but intrinsically a valuable Cotton.

No. 3—Was thought a good useful Cotton of a description much wanted: equal to "ordinary New Orleans," and worth 5*d.* to 5½*d.* per lb.

In March 1861 Colonel Davidson addressed to the Secretary of the Manchester Cotton Supply Association a memorandum on the Cotton trade of Hyderabad.

He states that the crop is extensively cultivated in the Berar districts, and in the Raichore Doab, but not in Dharaseo.

---

[*] Agricultural Journal, Vol. XI., page 470. These samples were the results of the experiments described above.

Two indigenous varieties are known, *Jherry* and *Bhunee:* names derived from the places where they are most grown: of foreign kinds the New Orleans is the only one which has been naturalized.

In 1859 there were 5,574 acres sown with New Orleans seed in the Raichore Doab: the yield was 145,396 lbs. of clean Cotton, or 26 lbs. per acre, which sold for Rupees 2-10-6 per Nagpore man, or 2·45*d.* per lb.: the value of the seed is equivalent to cost of cleaning, so that this gives nett value. The year was very unfavorable, however, and Captain M. Taylor had raised in this district a crop of New Orleans Cotton (from Dharwar seed), which yielded 155 lbs. of clean Cotton per acre, worth on the spot Rupees 16-6 (2·53*d.* per lb.). No deterioration in the quality of the American Cotton acclimated in the district has ever been observed, save that due to admixture with extraneous substances.

In West Berar the prevailing soil is the rich black loam; the climate is mild and equable for India.

In East Berar the soil is much diversified, the richest *Regur*, and a light red soil, both being found. About 60 per cent. of the land in the Raichore Doab is of the black Cotton soil, inferior, however, in fertility to the corresponding soils in Berar: this district feels both monsoons, but only the end of each, and there is often a deficiency of rain: the climate is mild and pleasant.

In West Berar irrigation is never employed for Cotton: but the Deputy Commissioner reports that there are considerable facilities for obtaining a command of water, and he thinks that by its application both the quantity and the quality of the Cotton crop would be improved.

In East Berar irrigation is never employed, nor is it supposed to be available.

In Raichore it is never used, and it is there believed that, although it would greatly increase the quantity of the out-turn, it would at the same time damage the quality of the Cotton: it is also supposed to attract to the plants insects which injure the color of the staple.

In all the districts the cultivation could, it is thought, be extended.

In East Berar the want of population keeps immense tracts uncultivated.

Generally speaking the rise in the price of cereals and oils would, of course, act as a check to the extension of the Cotton crops, unless its price rose in proportion.

The system on which the trade is carried on is thus described. Merchants, either belonging to the country or agents for Bombay traders, make advances during one season for the crop of the coming one, stipulating for a certain rate : the profits realized are said to be enormous, from 20 to 50 per cent. to the middlemen alone, who come between the villager and the local dealer : any one buying direct from the grower could greatly increase the price to him, and secure large profits besides : it is believed generally that a direct prospect of gain would induce the people to use better seed, to cultivate more carefully, and to pick their crop cleanly : in all which respects improvement is said to be much needed.

In Raichore alone have gins been introduced and used by the people, but they are considered too complicated for general adoption : although the cost of cleaning with them is only half that of the operation as performed by the churka.

Colonel Davidson concludes by recommending the establishment of agencies for the purchase of Cotton from the growers direct : a price might be given remunerative to the cultivators, and if cleaned, packed, and transmitted under European superintendence, the Cotton would, it is believed, return ample profits to the trader also.

DISTRICTS.	Per Acre.	Under the crop.	Could be added.	Produce in clean Cotton.	Available for Export.	Market price.	Transport to Port.	Waste land fit for Cotton.
	lbs.	*Acres.*	*Acres.*	*lbs.*	*lbs.*	*d. per lb.*	*d. per lb.*	*Acres.*
West Berar ..	121	354,805	25,000	59,134,166	44,350,625	1·99	0·75	194
East Berar ..	165	221,909	....	12,125,000	8,083,333	2·40	1·00	Considerable.
Raichore ..	40	243,795	756,205	1,293,333	833,333	2·80	0·75	100,000

71.000 [illegible]
180,000.

TABLE III.

Abstract of the Replies of the Revenue Officers of the North-Western Provinces to the six Questions circulated in 1848.

DIVISIONS.	DISTRICTS.	Price of clean Cotton.	Cost of transport to Port.	Produce per Acre.	AREA.	
					Under Cotton.	Which might be added.
		d. p. lb.	*d. p. lb.*	*lbs.*	*Acres.*	*Acres.*
DELHI	Paniput	1·79	0·42	117	14,820	1,883
	Hissar	2·04	0·63	115	9,271	2,000
	Delhi	1·85	0·82	86	3,321	3,321
	Rohtuk	1·96	0·72	224	14,552	4,198
	Goorgaon	1·78	0·82	126	29,617	5,801
	Average of Division	1·88	0·68	145	71,581	17,203
MEERUT	Mozuffernuggur	1·57	...	102	15,601	2,000
	Bolundshahar	1·92	0·28	226	14,505	....
	Allyghur	2·08	0·95	88	69,050	....
	Saharunpore	2·25	1·80	118	30,637	8,789
	Meerut	1·90	...	157	23,046	6,685
	Average of Division	1·94	1·00	138	152,839	17,474
ROHILKUND	Bijnour	2·18	0·53	162	19,039	....
	Budaon	2·40	0·19	117	34,091	45,398
	Bareilly	2·33	...	104	29,711	....
	Mooradabad	2·52	0·27	192	50,000	50,000
	Shahjehanpore	3·22	...	42	7,160	4,573
	Average of Division	2·53	0·33	123	140,001	99,971

TABLE III.—*(Continued.)*

DIVISION.	DISTRICTS.	Price of clean Cotton.	Cost of transport to Port.	Produce per Acre.	AREA.	
					Under Cotton.	Which might be added.
		d. p. lb.	*d. p. lb.*	*lbs.*	*Acres.*	*Acres.*
AGRA ..	Muttra ..	2·00	0·60	176	103,042	150,717
	Agra ..	2·22	0·52	110	87,000	33,000
	Furruckabad ..	3·00	0·75	190	14,148	7,008
	Mynpoorie ..	2·43	0·47	100	29,290	20,000
	Etawah ..	2·06	0·24	127	49,676	11,003
	Average of Division	2·34	0·51	141	283,116	221,725
ALLAHABAD ..	Cawnpore ..	2·35	0·24	194	101,111	101,111
	Futtehpore ..	2·40	...	98	29,745	9,709
	Hummeerpore ..	2·00	0·50	102	66,841	156,176
	Calpee ..	2·18	0·71	130	21,049	21,049
	Banda ..	2·10	0·45	81	102,852	......
	Allahabad ..	2·52	0·30	160	27,689	29,881
	Average of Division	2·25	0·37	129	349,287	317,926
BENARES ..	Goruckpore ..	3·75	...	...	1,300	....
	Azimghur ..	3·00	...	...	......	....
	Jounpore ..	3·15	...	...	......	....
	Mirzapore ..	2·66	...	...	......	....
	Benares ..	3·15	...	...	1,967	4,223
	Ghazeepore ..	3·45	...	...	1,649	1,649
	Average of Division	3·19	0·40	...	......	....

TABLE IV.

Average Prices in the Divisions from 1848—61.

		1848.	1850.	1851.	1852.	1853.	1854.	1855.	1856.	1857.	1858.	1859.	1860.	1861.
Delhi	..	1·88	2·40	2·03	1·72	1·63	1·84	1·81	2·25	..	..	..	..	..
Meerut	..	1·94	..	2·02	1·91	1·84	1·96	2·06	2·65	..	5·00	3·45	3·21	2·92
Rohilkund	..	2·53	2·56	2·00	1·98	1·97	2·88	2·05	2·29	..	5·43	3·78	3·04	3·16
Agra	..	2·34	2·39	2·05	2·21	2·08	2·05	2·01	2·47	..	4·20	3·75	3·72	3·07
Allahabad	..	2·25	2·47	2·43	2·38	2·12	2·56	2·23	2·52	..	6·15	4·97	3·62	3·75
Benares	..	3·19	3·67	3·40	2·69	2·78	2·12	3·16	2·84	..	7·41	4·27	3·96	3·76

Table III. is a reproduction of one constructed under the supervision of Mr. Muir,* to represent the general results of the statistics collected in the North-West Provinces as replies to the six questions of 1848: the column devoted to question 2† has been omitted, because the price at which the cultivator sells his Cotton, cleaned and uncleaned, with and without advances, is stated by the reporting officers themselves to be unascertainable with any thing approaching to accuracy, and the figures given to be mere guess-work: the column for question 3‡ has also been omitted: it would, it was thought, have been calculated to mislead, for wherever a sum is stated as the cost of cleaning a man of Cotton, the value of the seed ought to be taken into account as a set-off: this in the replies was sometimes done, and sometimes not: nor is it always clear, when the cost of cleaning a man of Cotton is stated, whether the weight referred to is that of the raw produce, or that of the cleaned Cotton: finally, as the value of the seed almost always equals, and often exceeds the cost of separating it from the wool, this item may be safely omitted in all calculations of the prices of Cotton in this part of India.

It will be found that discrepancies occasionally exist between the figures given in this table and those contained in the detailed reports of the

---

* The Indian weights, measures, and coins, as used in Mr. Muir's tables, have been for the convenience of the reader reduced to pence, pounds, and acres.

† At what price does the riot sell his Cotton, clean or uncleaned, with or without advances?

‡ What is the expense of cleaning Cotton with the churka, or other method?

CSL

Commissioners of the different divisions, and of the Collectors of the different districts : it is presumable that there was good reason for altering the original figures, although we are not told what it was, and in the foregoing pages both statements have been in many cases reproduced for comparison, those found in the text being (when not otherwise described) taken from the reports of the district officers.

In Mr. Muir's table the last column shows the area to which it was thought the Cotton crop might be extended, including that occupied by it at the time : I have preferred to place there instead the number of acres which might be added to the then existing breadth of cultivation, because when the district officers merely stated that "only a few acres could be brought under the crop," or that "a vast extension might be effected," no figures appeared for that district, and (as in the case of the Meerut division) when the total came to be taken for the division, the blanks thus left caused column 5 to represent a larger sum than column 4, an apparent contradiction which it was thought better to avoid: whereas, as the figures now stand, although they probably often represent too small a number, yet that number is always a positive and intelligible one.

Table IV. will show that the average price of Cotton throughout the province, during the years from 1848 to 1856 inclusive, oscillated about 2*d.* per lb., a little above or below according probably to the goodness of the season, on the whole an advance is perhaps apparent : the Allahabad division presents higher prices than the country farther West, and Benares, from our point of view, belongs rather to Bengal than to Upper India.

The year 1857 is of course a blank, and in the current year (1861) the excessive prices of 1858 appear to have been settling down towards the rates of 1856 : but it is not improbable that the effect of the famine was slightly to enhance the price of Cotton as well as that of other things, and that were it not for this disturbing cause, the last column might have presented smaller figures: on the whole, if we eliminate what may fairly be considered as the results of temporary causes of disturbance, the figures in this table, as well as all others, to which I have had access, seem to point to the conclusion that the price at which Cotton can be bought has in these Provinces risen perhaps ½*d.* per lb. within the last twenty years. I must however once more remind the reader that this, and all such statements are made as what seems to me to be the legitimate tendency of the evidence submitted to him in the foregoing pages, and not as assuming to be definite results derived from an exhaustive analysis of all the facts of the case.

The following tables and remarks are placed here, because they have reference to the Cotton trade of the Bengal Provinces generally:—

TABLE V.

Prices of Cotton from 1755 *to* 1860.

	IN CALCUTTA.		IN LIVERPOOL.
	Lowest.	Highest.	Average of Indian Cotton.
	d. per lb.	*d. per lb.*	*d. per lb.*
1755	* 10·03		
1790	‡ 2·14	† 2·52	21
1802§			15
1813‖	3·90	6·00	15¾—19¼
1820	4·20	6·10	¶ 11¾
1826	4·95	5·70	9
1827	4·35		6
1829	3·30	4·20	5
1830	2·62	4·20	5¾
1831	2·25	4·15	5¼
1832	3·00	4·50	4¾
1833	3·60	4·40	7¼

* Imported for Government from Bombay and sold by public auction at Calcutta.

† Broach and Surat Cotton.

‡ Cotton from the Deccan and the North-West of India.

§ The average prices of 1790 are said to have obtained.

¶ These Liverpool prices are for Surat, and therefore higher than they ought to be, in order to correspond with those in the other columns.

‖ Previous to this entry the figures represent import price, subsequent to it export price: that is to say, the prices at which Cotton sold in Calcutta since it formed an article of export.

TABLE V.—(*Continued.*)

Prices of Cotton from 1755 *to* 1860.

	In Calcutta.		In Liverpool.
	Lowest.	Highest.	Average of Indian Cotton.
	d. per lb.	*d. per lb.*	*d. per lb.*
1834	4·05	5·40	7½
1835	4·20	4·68	8
1836	3·07	[illegible]	7¾
1838	3·15	4·65	5¾
1839	3·52	4·50	6¾
1840	3·00	4·50	5¾
1841	3·30	4·53	5¼
1842	2·77	3·90	4
1843	2·70	3·86	3¾
1844	2·47	3·56	4¼
1845	2·51	3·45	3¼
1846	2·47	3·60	4¾
1847	2·40	3·33	3¾
1848	2·55	3·45	3¼
1849	2·43	3 41	4¼
1850	2·55	3·86	5⅛
1851	2·51	3·87	4
1852	2·51	3·72	3¾
1853	2·36	3·22	3½
1854	2·46	3·37	3½
1855	2·74	3·26	3⅞
1856	2·85	3·30	4⅜
1857	2·85	4·50	5⅜
1858	5·10	6·15	4¾
1859	4·20	6·15	4¾
1860	4·05	4·50	

The following statements and figures are taken from *Mann's Cotton Trade of Great Britain*:—

"The earliest period we have any statistics to bear on the subject (of "Indian Cotton trade), is of the port of Calcutta, from the year 1795-6, "at which date almost the whole of the Cotton exported from India was "made through that port."

Several statements have been quoted in the foregoing pages, which are inconsistent with this: we have seen that Calcutta for many years imported Cotton from Bombay: that the first Indian Cotton reached England from Surat, and J. Phipps, in his *China and Eastern Trade* states that the first export of Cotton from Calcutta to China was made in 1802, although Bombay had sent Cotton there for many years previously.

TABLE VI.—*Total Cotton exported from Bengal.*

DECENNIAL AND QUINQUENNIAL AVERAGES.

					lbs.
Per annum	from	1796	to	1805	3,903,738
"	"	1806	"	1815	16,470,990
"	"	1816	"	1825	33,533,285
"	"	1826	"	1834	16,934,258
"	"	1835	"	1839	31,380,575
"	"	1840	"	1844	13,976,820
"	"	1845	"	1849	9,900,497
"	"	1850	"	1854	22,663,188
"	"	1855	"	1858	9,702,974

The export trade of Cotton to China from India is said by Mr. Mann to be subordinate to that with England: for that in the latter market high prices are sometimes obtained for Indian Cotton, in the former never: when high prices are to be had in England Indian Cotton goes West; when they are not to be had then it goes East. "In the case "of the export (of Indian Cotton) to Great Britain the increase* in "the last twenty years has been 262 per cent., while the increase in

---

* Cotton Trade, page 62.

CSL

"the total exports to all parts has been only 82 per cent."* The difference is stated to have been made up by a decline on the quantity sent to China.

TABLE VII.—*Price per lb. in d. of Indian Cotton in England.*

		Average quantity of Cotton annually sent from Calcutta to the English market, during corresponding periods.
1790	21	
1800	14	
1810	15½	
1820	8½	
1830	5	2,742,787 lbs.
1840	4⅝	345,655 „
1850	5⅛	1,766,864 „
1857	5⅜	

TABLE VIII.—*Proportion of Indian Produce to the total quantity of Cotton imported into England.*

From 1820 to 1824	9 per cent.
„ 1825 „ 1829	10 „
„ 1830 „ 1834	9 „
„ 1835 „ 1839	12 „
„ 1840 „ 1844	14 „
„ 1845 „ 1849	11 „
„ 1850 „ 1854	16 „
„ 1855 „ 1859	18 „

TABLE IX.—*Total Imports of Cotton into England from India.*

1799 to 1808	3½ million lbs.
1809 „ 1818	19¾ „
1819 „ 1828	23 „
1829 „ 1838	38 „
1839 „ 1848	72¾ „
1849 „ 1858	140¾ „

---

* This statement is given as it stands, but it is strangely in consistent with much that we ear of the declining state of the Anglo-Indian Cotton Trade.

TABLE X.—*Total quantity of Cotton imported into England from Bengal.*

1850	85,789
1851	1,175,940
1852	557,088
1853	7,660,242
1854	1,144,416
1855	86,912
1856	1,418,928
1857	2,538,560
1858	190,400

Mr. Mann discusses at some length the question as to whether more or less Cotton is now grown in India than formerly: he says that making allowance for the manufactured Cotton now imported into India, and remembering the decline of the export of manufactured Cotton from India, the increase in the weight of the Cotton now exported shrinks to comparative insignificance; and if we assume that the wants of the natives of India and the quantity of Cotton they need for their consumption, have remained stationary, it would follow as a matter of course that the production has declined, and the Cotton crop fallen off. "There is, however," Mr. Mann thinks, "abundant proof that the wants of the people have not remained stationary;" and he finds proof of this in the two following facts: first, in the large excess of the value of Indian produce imported into Great Britain over that of British goods imported into India, from which "we may infer that there has been an increased "internal demand for, and consequent production of, native manufactures, "even though the quantity of the raw and manufactured Cotton exported has not greatly increased." In the next place he shows (see Table VI.) that there has been a decrease in the price of Indian Cotton since 1790, and that in presence of this decrease the quantity sent to England has increased: from which, he says, "it is evident that the value of the "article in the Indian market is comparatively lower, either arising from "an increased production or an improved and cheapened mode of

CSL

" cultivation: and applying a very commonplace rule, this fully proves " that the people are permitted and will exercise a greater consumption " under the cheapness, necessitating an increased production, if a profitable one, and which, if it were not, would force a corresponding increase " in price until it became so."

Mr. Mann, in fact, believes that there is certainly a larger quantity of Cotton grown now in India than there ever was, and arrives at this conclusion by a process of reasoning widely different from that which has led others to adopt the same belief. The reader has been furnished in the earlier pages of this volume with all the evidence I have met with bearing on this question, so that Mr. Mann's statement and arguments need no further comment here.

CSL

PART II.

NARRATIVE OF EXPERIMENTS.

THE Court of Directors, in a letter written in 1829, alluded to an experiment made by Mr. Assistant Surgeon Henderson, at Allyghur, on the cultivation of exotic Cotton : and another trial, which is stated to have been on a large scale, had been made in Balasore : many others had prably been instituted, for the letter says, " we have for many years directed our "attention to the introduction of foreign kinds of Cotton into British "India, and lament our failure."

Both in the Bombay and Madras Presidencies these early experiments were attended with a certain amount of success, and their history has been placed on record by Dr. Royle : but of the Allyghur and Balasore trials, and of the others above alluded to, I have not been able to find any account whatever ; Dr. Royle has not even mentioned them in his chronological list of " measures adopted to improve the culture of Cotton in India."*

As regards the experimental cultivation of exotic Cotton, by order of Government, in the Bengal Provinces, and so far as our information on the subject goes, the initial impulse originated in a letter addressed to the Court of Directors in 1828, by Lord Ellenborough, when he was President of the Board of Control.

In February 1829, but not ostensibly as the result of this representation, the Court wrote to order an experimental farm to be established (in the Bombay Presidency) : a superintendent was to be paid by Government, who should manage the farm under the supervision of the Collector of the district which might be selected.

---

* See Culture and Commerce of Cotton, &c., page 86.

GSL

The first object was to be the improvement of indigenous varieties of Cotton: and the proper cleaning and preparation of these for the European market: and a supply of American seeds was promised for the next year's crop, which were to be cultivated side by side with the native kinds, and a fair trial made: from the result of which it might be satisfactorily determined to which kind or kinds attention might more advantageously be directed: this point settled, small model farms were to be established in many places, where soil and climate appeared to suit the plant: and native cultivators were to be encouraged to adopt the new crop, by prizes which were to be given for fine specimens of its produce.

Land, also, was to be granted to properly qualified Europeans, on easy terms, and long leases, with the condition attached, that they should engage to grow the approved kind of Cotton.

THE AKRA FARM.

In July 1829 the Court informed the Governor-General, that a large supply of American seed of different kinds had reached them: as well as several "Whitney's gins."

His Excellency, in May 1830, requested the Agricultural Society to offer suggestions as to the manner in which, in their opinion, effect could best be given to the intentions of the Court: first, as to whether private individuals might be found willing to accept the seed and carry on the cultivation: secondly, if success cannot be anticipated from any plan "without the assistance of Government," whether a farm of 500 bigas could be obtained where the cultivation might be undertaken at the public expense.

The Society submitted plans which were approved of: Rupees 10,000 per annum were allotted to cover the expenses, exclusive of rent: Rupees 4,500 were added for buildings and stock to start with; and, "after

CSL

much negotiation and vexatious delay," the Committee entrusted with the task, finally decided on taking a plot of ground at Akra, consisting of 456 bigas of land : a Sub-Committee, consisting of ten members, was named, two of whom were to visit the farm twice a week, and Mr. J. M. de Verinne was appointed Superintendent, and entered on his duties on the 17th November 1830.

When drawing up a final report of the results of the experiment, the Committee of the Agricultural Society take occasion to acknowledge the zeal and efficiency, by exercise of which this gentleman had justified their selection.

When the Society entered on possession, there was a small plantation of Seychelles Cotton (37 bigas) already on a part of the ground : this they purchased.

Save this portion of it, "Akra was a perfect wilderness, the land "being overgrown in every direction with rank grass ; immense labor "was required to root it out, and keep it from choaking every thing sown."

Report on Cultivation.

Sea Island Cotton.

In November 1830 seven bigas were sown with this seed : the ground had been carefully prepared, but more than a biga was ultimately bare of plants, owing, it was thought, to excess of salt in the soil : the plants flowered in February 1831, ripened in April, and yielded a very superior long-stapled Cotton, but in small quantities. During February, March, and April 1831, forty-nine bigas were sown with this seed ; the plants flowered in April, May, and June, and yielded fine Cotton, but in very small quantities.

In June six bigas were sown with seed produced on the farm, but which did not germinate ; twenty bigas were sown in November, which germinated, but "came to nothing."

In the same month, November 1831, one hundred and twenty bigas were sown with Sea Island seed, received direct from America: it proved a total failure.

New Orleans Cotton.

In November 1831 fifty-nine bigas were sown with New Orleans seed, all of which failed: the seed was supposed to have been bad.

Upland Georgia seed.

In November and December 1831 seventy bigas were sown with Upland Georgia seed: the plants flowered in February 1832, and the Cotton was picked in April: it was of excellent quality, but the quantity was insignificant.

Bourbon seed.

Fifty bigas were sown (it is not stated when) with seed received from the Mauritius; the plants flowered in September: the Cotton was picked in December, the quality was excellent, but the return very small.

Ten bigas, sown in November 1831, failed.

Fifty bigas, also sown in November 1831, produced a crop, of which the small quantity picked was excellent in quality.

Seychelles Cotton.

The Society found thirty-seven bigas sown with this seed: they yielded a fair return, and of fine quality.

In November 1831 there were sown of Sea Island twenty bigas (exclusive of one hundred and twenty where the seed did not germinate): of Upland Georgia, seventy bigas: of Bourbon, fifty bigas: in all, one hundred and twenty bigas. On the 24th and 26th of March 1832, the whole of this crop, which was then coming into flower, was destroyed by hail-storms, and only a few pods saved.

Mr. de Verinne subsequently reported that after this storm nothing was left save the stumps of the Cotton plants; "these stumps threw out "fresh shoots during the rainy season of that year: they were partially "pruned, and well hoed up at the conclusion of the rains, and yielded

CSL

"from December 1832 to May 1833 12,963 lbs. of seed Cotton, from "which was obtained an average of 40½ lbs. of clean Cotton per biga, or "about 120 lbs. per acre." This statement seems to refer only to the Upland Georgia Cotton, of which it is stated that ninety bigas were standing at the time of the storm: I find no mention of the other crops, then also in the ground.

Such is the scanty record of the facts of this unfortunate experiment.

Opinions expressed in Reference to the Results.

The Society's Committee reported in 1835 on the above details: they believe that two positive results have been attained.

1st.—"It is not going too far to express their confident decision in "favor of the Upland Georgia Cotton, which they hope ere long to see "the grand staple export of India."

2nd.—They remark that a useful lesson may be learned from the results of the storm: in Persia, the Cotton plant, after the crop has been picked, is grazed upon by cattle, and then cut down close to the roots, from which condition it springs up again to bear its next year's crop: similar treatment is suggested by the success of the Upland Georgia plants after the storm.*

3rd.—That American Cotton will not grow on a rich, moist soil.

In addition to these direct results of the experience gained at Akra, the Committee state that the experiment shows that besides Upland Georgia, Sea Island and Bourbon seed grow and produce fine Cotton in this Country, although in this first attempt only a very small quantity was obtained.

They deprecate any hasty generalization being drawn as to the Cotton-producing capabilities of British India generally, or even as to those of Bengal, from an experiment conducted under circumstances so exceptional as those at Akra.

---

* Mr. Weeks, of Cuttack, had, three years previously, placed on record in the Society's Transactions, Vol. II., page 110, his advice to the same effect.

As to the causes of failure, the Committee say, "the principal ones "lie in comparative ignorance of the proper seasons for sowing, in bad seed, "and in the selection of land wholly unsuited to the growth of Cotton."

That the land was unsuited is, they say, shown by the "rapidity "and luxuriance of vegetation in the production of wood, leaf, and flower, "but little Cotton: by an almost unceasing process of blossoming "exhausting the plant before it had attained maturity."* All which, as well as the short crop, prove that part of the soil of the farm was too rich: the failure of certain sowings is partly due to the fact of much of the seed having been spoiled, but also to the saltness of some of the soil at Akra.

The Superintendent subsequently submitted the following statement as embodying the practical results of the Akra farm trial.† He believed that Upland Georgia Cotton might be cultivated "in the "Mofussil, where good land may be had in any quantity, and at a "cheap rent."

Cost per Acre.

Rent...	s.	6	0			
Cultivation...	„	12	0			
Picking, and cleaning by churka	„	18	0			
				£1	16	0
Agency, commission, &c., in Calcutta	s.	12	0			
„ „ in England	„	12	0			
				£1	4	0
Total ...				£3	0	0

---

* It has however been thought by some that all these phenomena only prove that the soil and climate possess vigorously active capabilities, which skilful culture will yet succeed in directing to the development of the seed and wool of the Cotton plant, instead of permitting them to waste their energies in stimulating the production of wood and leaves.

† I have reduced the sums from those given to the corresponding figures for acres instead of bigas.

Returns per Acre.

121½ lbs. of clean Cotton, at 7*d.* per lb.	£ 3	10	9½
310½ lbs. of Cotton seed, at 2½*d.* per lb.	£ 3	4	8½
Total ...	£ 6	15	6

Nett profit per acre... £3-15-6.*

In quoting this estimate, the Committee remark that Mr. de Verinne has taken rent, &c., at a fair value; that the seed, instead of 2½*d.* per lb., cost 4½*d.* per lb., but might not perhaps always realize so much as the former sum: that there is fair reason to expect that larger returns per acre might be hereafter obtained, and that as to the price obtainable for the produce, the estimate is fully supported by the result of the examination and valuation of the Cotton sent home.

Altering the above in accordance with the Committee's suggestion, that the 310½ lbs. of seed might not be assumed to be worth more than 16 shillings, we have

Total return	£4	6	9½	
Cost of production, &c.	£3	0	0	
Nett profit	£1	6	9½	per acre.

"The statement of Mr. de Verinne, when it may go before the public, "has such a tendency to lead to speculation, that the Committee deem "it proper to bring to notice what has occurred to them at all question-"able in the general estimate."

The Upland Georgia Cotton grown at Akra realized in Liverpool, in March 1834, an average of 7*d.* per lb.: in July 1835 it would have sold for 9*d.* per lb.

A parcel of it was submitted to Mr. Patrick of the Gloucester Mills, who, after "watching it through the various stages of cleaning, carding,

---

* A slight inaccuracy is introduced into the statement made by the Committee (see Agricultural Transactions, Vol. II., Appendix, page 32): 103½ lbs. at 2½*d.* is set down as equal to 21*s.* 3*d.*; it ought, of course, to have been 21*s.* 6¾*d.*

CSL

"roving, spinning, &c., had no hesitation in characterising it as equal to "the very best Upland Georgia Cotton ; its staple is fully as long, and I "would say stronger, and better adapted to mule spinning than any I "have imported direct from America."

Finally, the Committee state that the hail-storms which had proved fatal to their hopes of a crop, must be considered as only a secondary cause of failure, and they state their belief that the ground had not been sufficiently deeply ploughed, and that the system of sowing the seed broad-cast will not be found to answer.

Dr. F. Royle says in reference to this experiment, "It is to be "regretted that the Committee having had practical experience, and "apparently such just views of the causes of failure, did not prosecute "their experiment for a few years longer on a small scale, as 5 acres "would have answered as well as five hundred for determining many "of the unsettled points of soil and of culture in so warm and moist "a climate."

In November 1837 the Agricultural Society again had the subject of the Akra experiment under discussion. Some bales of the produce which had been laid aside for despatch to the Court of Directors, (in 1832) had, after lying in India for nearly four years, been submitted to London brokers in June 1836 ; their report was as follows :—

Upland Georgia, cleaned by saw gin :—

1*st*.—Good, fair, clean, and bright : worth 8½*d*. to 9*d*. per lb.

2*nd*.—Samples not so good, middling, clean, uneven staple, injured in cleaning, brown : worth 7½*d*. to 8*d*. per lb.

Cleaned by churka :— .

3*rd*.—Fair, uneven staple, a little leaf remains, rather high-colored : worth 8*d*. per lb.

Sea Island, cleaned by saw gin (which in America is never employed for this kind of Cotton), fair, fine, but uneven, a little leaf, and much stained : if clean and not stained, this sample would be worth 12*d*.

CSL

At the time these values were assigned to the Akra samples, the corresponding prices of American Cotton were :—

Sea Island (stained)	12¾d.
Georgia	10¼d.
Surat	7 d.
Bengal	6 d.*

The Committee re-assert their confident expectation, that Upland Georgia Cotton will become a staple of agriculture in India.

Mr. G. A. Prinsep appended a note to the report which embodied the above views: the report admits "that degeneracy, to a certain "extent, had taken place in all descriptions of Cotton cultivated at "Akra ;" but it refers this failing to the peculiarities of the locality of Akra, to bad seed, and to the mixture of the produce of different crops. Mr. Prinsep is not of opinion that Akra is an unfavorable position. He believes that the soil there is not to blame for the failure of the Sea Island Cotton, but that the climate is unsuited to the plant ; there is a drought during the flowering season, as well as a cold weather ; he speaks of the utter failure of Sea Island Cotton tried in 1826, in Balasore, and states that the fine samples of this variety obtained at Sagur Island were the produce of a carefully tended garden ; but that the trial sowing there had been a complete failure ; he asserts that there has never been known a successful cultivation of Sea Island Cotton in Bengal, and that at best a few choice pods have been picked from garden plants. He says, that Sea Island and Bourbon Cotton may be abandoned for Bengal.

The Georgian kind he has hopes of, for as it has partially succeeded almost everywhere, it may do well in some of the various climates of British India.

---

* When the Cotton sent for sale was disposed of (see ante) in March 1834, the corresponding rates were 11½d., 8½d., and 6¾d. respectively, no price for Bengal being that year mentioned.

THE FOUR AMERICAN PLANTERS.

In March 1839 the Court of Directors addressed the Governor-General of India on the subject of Cotton.

The success which had attended the exertions hitherto made for improving the Indian crop had not been as great as could be wished; there appeared, however, no reason to doubt that, under proper management and superintendence, India is capable of producing Cotton in quantity and quality to compete with the Cotton of North America, which the best Surat Cotton often rivals; to gain this object, full information is required as to the best mode of culture, as to the localities best suited to the fine varieties of the plant, and as to the machinery by which large quantities can be rapidly cleaned without injury to the staple.

With a view to this kind of knowledge, as a means to the attainment of the above objects, they were determined on deputing some person to visit North America: there to secure the services of men duly qualified by knowledge and practical experience, who would be willing to go to India to superintend the growing, cleaning, packing, &c., of Cotton, and to instruct the natives of that country in the best methods and processes.

Lord Auckland, in a minute dated August 1839, reviewed the results of past proceedings in the matter of Indian Cotton.

On the taxing of Cotton lands.

The Manchester merchants in a memorial which they had addressed to the Court of Directors, were mistaken in supposing that Cotton lands were taxed by Government at a maximum rate, also in thinking that taxes were levied in kind, and finally in attributing to this mode of collecting government revenue, a falling-off in the cleanness of the Cotton. Cotton land was not more highly assessed than other land; taxes had long ceased to be levied in kind: and Sir John Malcolm asserts that the effect of that mode of collection had been not to deteriorate, but greatly to improve the quality of the Cotton: the

CSL

Government share of the crop being always taken at a valuation in proportion to the care with which it had been gathered and prepared: and that a falling-off in the quality of Indian had been a direct consequence of the abolition of the system.

The reduction of assessments.

In a memorial addressed to the Court by the Glasgow merchants, they had suggested that a bounty should be offered either by the reduction of the assessment on land where foreign Cotton might be grown, or by stimulating the cultivation by large grants as prizes. " With regard to this His Lordship deprecates all artificial fostering of " the devotion of capital to particular employments."

Experimental farms.

He does not believe that valuable results will be obtained from experimental farms conducted by paid servants of Government and maintained at the public cost, but " superintendence and encouragement, on a carefully regulated and measured plan, of the efforts of private cultivators, may be productive of important benefit.

With regard to the American workmen who were to be sent to Bengal, he proposes to entrust to the Agricultural Society the general guidance of their undertaking and superintendence of their operations.

In pursuance of the last suggestion, the Society was requested to submit a plan of operations.

The Agricultural Society's project.

In February 1840 the Committee reported as follows:— They advise that the planters be stationed at Agra, at Banda, and at Jubbulpore respectively. At each of these places cultivation should be carried on both by paid labor, and by contract with villagers: the former directly under the management of the planter, the latter under his general control and supervision: each planter was to have an "associate conversant with the language and agriculture of the district," and zilladars selected from the best cultivators were to be

CSL

placed in charge of small districts under the superintendence of the planter. The farm cultivation should be considered as a model establishment for the introduction of foreign seed, the contract cultivation as a means of ameliorating native kinds.

The revenue officers in each district would exercise a general supervision: and it was suggested that Dr. Falconer at Agra, and Mr. Macleod at Jubbulpore, and Mr. Bruce at Banda, might consent to afford the aid of their scientific and general knowledge. A scale of pay is given.

Finally, the Committee present a scheme of premiums to be awarded for the cultivation of Cotton under certain conditions elaborately specified, and they propose that the 1st of October 1843 be fixed for the first competition.

Lord Auckland, in forwarding this Report to the Court of Directors, remarks that the offer need not be delayed until 1843: that a prize of £2,000 on a quantity of Cotton itself not worth more than £3,000, seems large, but that if it lead to extensive competition, the money will have been well spent.

Mr. H. T. Prinsep, in a minute appended to the report, says:—The cost of the experiment as arranged for in the Society's scheme, is Rupees 3,060 per month for all three farms: being exclusively for establishment, and distinct from all rent, charges for labor, advances to cultivators, &c. He estimates that including such charges, the experiment will not cost less than £10,000 per annum.

His first objection is that were the sum employed, three instead of one lac of Rupees per annum, the charges (as above given) for establishment would be still excessive: any commercial man engaged in trading on the produce of the country would consider his establishment over-paid were it to exceed 5 per cent. on his outlay: to work the establishment proposed on this commercial scale, the outlay ought to be seven and a half lacs of Rupees per annum.

His next objection is, to the prizes: He believes, indeed, that under the conditions annexed they can never be claimed: these conditions imply that some person, or firm should set up an establishment (not to trade in Cotton) but to gain the £2,000 offered: but besides this he disapproves of the offer of prizes at all on the part of government. He has little faith in the effect of prizes for the improvement of objects of general commerce; they are useful in encouraging gardeners to compete with one another in rearing plants and vegetables. "But in the case "of articles of general commerce, like Cotton, sugar, or indigo, the "question is not how to produce the best, but how to make the best "bargains: that is, to produce the article in demand, on terms to "compete successfully with that offered by others. The indigo of "Guatemala has been driven out of the markets of Europe by that of "Bengal, not because the latter was at first of superior quality, but "because it was offered cheaper and in large quantities: if at the "time when the cultivation of indigo commenced, the efforts of the "first speculators had been directed to quality, by a prize, conditional "on their overselling that of Guatemala, their time, labor, and money "would assuredly have been thrown away, and the results we now see "would have been retarded rather than accelerated by the ill-judged "interference. The first essential of an article of commerce is not its "quantity but its cost, compared with what it will fetch: and prizes for "improving quality without regarding the cost of production derange the "course of sound speculation: the Cotton produced to gain the proposed "prize, however superior it might be to Upland Georgia, would be of no "avail at all for commerce, unless grown, packed, and conveyed to Europe "so as to undersell that of Georgia, or at least to afford a better profit: "that is the point to aim at: it is out of the reach of a prize: or rather "it carries in itself the prize of assured wealth to the discoverer."

Such being Mr. Prinsep's views on the subject of prizes, he declares himself equally opposed to any experiment on the part of Government which attains the proportions of a commercial speculation. “It is “possible, nay probable, that the Government establishment might “succeed in producing better staple, and better picked Cotton than ever “was produced in India before: but the grand essential of cost is always “overlooked in such experiments, and the boast of success, based only on “the exhibition of quality, is a vain and useless pretension, that can lead “to no useful result or permanent benefit.”

In July 1840 the Court of Directors addressed the Governor-General: they had received the Agricultural Society’s report and plans, with the minutes attached thereto: they remark, “The advice or assistance “of this Society may frequently prove of great use to your Government: “on the present occasion, however, it is not consistent with our objects “and intentions that the Society in question should assume any direct “superintendence of the American planters, or the charge or regulation “of the experiment. On the contrary, we are of opinion, for various “reasons, that the most important objects connected with the experiment “would, in a great degree, be frustrated by the appointment of a Committee of this Society as the intermediate authority between the “planters and Government.”

They have selected Captain T. Bayles to accompany the four American planters who are destined for Bengal; they think it desirable that the men should for the first season be left close together; they direct attention to the views stated by Captain Bayles and by the planters, as to the manner in which their services can be best utilized. Saw gins, threshers, ploughs, &c., were sent, as well as large supplies of seed.

A copy of a memo. on the cultivation of Cotton in India, prepared by Dr. F. Royle, was also sent:—Dr. Royle enters at large into the history of the cultivation of Cotton in India and the trade of this country with England. He also sums up the leading facts of past experiments, points to the obstacles to be overcome, and hopes that success may yet attend further efforts.

CSL

He insists on the almost certainty that many places must exist where the conditions of soil and climate are favorable to the growth of the American varieties of Cotton, but he cautions the planters against expecting that their American methods will be found at once successful: the whole hope of success lies, he says, in the adaptation of certain kinds of seeds, and certain modes of cultivation, to the circumstances of different localities as to soil and climate, and especially the latter. He suggests that the advice of scientific men in India should be taken advantage of in the cases which must arise of anomalous results to be expected from the attempted naturalization of exotic plants and foreign methods of culture. Finally, he says that the right bank of the Jumna (the north of Bundelkhund) should be tried, the Doab also, and some place on the central plateau, Sagur, or Jubbulpore, for instance. He thus, in all essentials, confirms the recommendations of the Agricultural Society.

Captain Bayles and the four American Cotton planters, Messrs. Mercer, Blount, Terry, and Finnie, reached India in January 1841.

It is evident that the Government left their arrangements to themselves; they were from the first not only practically uncontrolled, but were supplied with the readiest liberality with every thing they required; it seems to have been determined that they should judge and act for themselves, and the fullest confidence was reposed in their judgment and activity.

Shortly after his first arrival, Captain Bayles addressed a memo. to Government: "It is my earnest request that the American planters "may be permitted to cultivate their respective farms each according "to his own judgment; they have all been reared on Cotton plantations: "from my knowledge of their character, I believe, were any other system "pursued, it would decidedly check their zeal."

They were evidently not to be interfered with, and as they did not seek the advice or suggestions of the Agricultural Society, or of others, they had completely their own way from the first.

Captain Bayles recommended "that each planter should have about "200 acres of land, situated in different places, not certainly farther "than 10 miles from his head-quarters."

Calpee was selected for Captain Bayles' station, two of the planters were to be placed in the Doab, and two in Bundelkhund, close to the banks of the Jumna.*

In the end of March Captain Bayles and the four Americans were at Cawnpore, and before the end of May the latter were settled on their respective farms, and the Superintendent himself at Hummeerpore; Mr. Blount at Somirpore; Mr. Mercer at Rauth; Mr. Terry at Chauk; and Mr. Finnie at Kotra.

Operations in 1841.

MR. BLOUNT, SOMIRPORE.

Soon after his arrival Mr. Blount selected 450 bigas of land on different soils. The bullocks sent to the farm were, he says, "of such a "degenerate kind, as to be entirely useless, and "all my arrangements were frustrated." He purchased some better cattle, got ploughs made and set to work; the natives would not make his ridges properly with the hoe, and his purchase of oxen was not sanctioned; he, however, got 231 bigas of land broken up by his own cattle and the American plough, the Government cattle and native plough failing to stir the ground deep enough. Some of his first sowing did not come up.

Some contract cultivation, although "imperfectly farmed, proved decidedly the superiority of the American mode of planting."

The year was a bad one for all kinds of crops; the rains were late; the land was in bad condition, being covered with briers and bushes, which had to be removed before ploughing; his Cotton, however, came up in from five to ten days, grew finely, and promised an abundant crop. About the 20th September he observed that it was suffering from drought, the bolls began falling off, and in a few days four-fifths of them were gone.

---

* This plan was subsequently modified, as will be seen.

He had during the year 20 bigas sown with *Sea Island* seed; this came up very badly, only produced a few stunted pods, and yielded no Cotton.

Of *Mexican* seed he had sowed 155 bigas, 60 bigas of this came up so badly that it was not worth cultivating, and produced next to nothing; 17 bigas did not come up at all; from the rest he obtained 4,850 lbs. of seed Cotton.

Two hundred and twenty-three bigas of *American** seed were sown in July and August: from this 10,979 lbs. of seed Cotton were picked.

Of *Native* Cotton he tried 7 bigas, from which he picked 864 lbs. of seed Cotton; this was sown on good land *(Mar* and *Khabur)* "on the American system, and well cultivated: the effect of which on "the plant was most surprising, for when the other native fields were "quite dried up (though on the same soil) this was flourishing." Besides the above, which he cultivated himself, 241 bigas of Mexican and native Cotton were sown by the villagers under his instructions. This, he says, "was very fairly planted, but all I could do, I could not get it worked"; it had, however, the advantage of having been in the ground from fifteen to thirty-one days, before any of his own sowing.

MR. TERRY,
CHAUK.

Mr. Terry sowed *Mexican* seed only; he had 80 bigas under cultivation himself: the land, he says, "was bad: what I did plant was with native "bullocks that I hired by the day, and was obliged "to give way to their prejudices: and, of course, I could do but little, as

---

* American seed is several times spoken of in the course of the experiments, but the kind not specified: probably Georgian.

" the small Goruckpore bullocks could not plough either with the native or " American plough." He, nevertheless, picked 377 lbs. of *clean* Cotton.

He had 426 bigas sown on the contract system, from which he gathered 2,074 lbs. of clean Cotton : he complained bitterly of the quantity of his Cotton, which was stolen both from his fields and from his stores.

Mr. Mercer, Rauth.

Mr. Mercer arrived at Rauth on the 7th of May : from that time until the commencement of the rains he occupied himself in constructing some agricultural implements, in preparing his land, building sheds, and instructing his laborers : on the 19th June the cattle he had been expecting arrived, but they were useless; " they " would not pull a pound, but lay down the moment the yoke was " on them." No rain fell until the 20th July : by the 2nd August he had 20 bigas sown : the plants suffered from the heavy rain which followed : early in September the rain ceased, and the crop revived under the influence of the heat : before some commissariat bullocks, which he obtained from Cawnpore, had enabled him to break the earth about the roots of his plants, the ground had been baked hard and dry, the plants began to wither, and the young pods fell off in showers : this continued up to the 1st October, when the weather became cooler, though there was no dew : the pods still remaining on the plants revived, however, under the change : from the 10th they still farther improved, and fresh leaves and buds began to appear. Shortly after he found that a worm had attacked the bolls.

The rains all fell within six weeks, and Mr. Mercer considers that it is wonderful the plants survived the drought they had to undergo : from the fact of their doing so he entertains high hopes for the future.

From these 20 bigas of *Mexican* seed he ultimately picked 1,520 lbs. of seed Cotton ; he had also tried 2 bigas with *Sea Island* seed, but only a few bolls came to maturity.

CSL

MR. FINNIE, KOTRA.

Mr. Finnie was on his farm on the 12th April: he occupied himself at first with some preparations; his farm cattle arrived on the 18th June;* they were quite useless, and would not work: when the first rain fell on the 24th, finding that they could not be got to do any thing, he purchased some others with which he broke up his ground, and commenced sowing on the 28th.†

On the 4th July he had planted 60 bigas: and the seed sown on the 28th and 29th June showed above ground. The ground soon became too hard to be broken by the plough, but by the 26th August he had sown all the land that he had been able to prepare for seed: nearly half of all that had been up to that time sown, having failed, he commenced filling up the blanks with fresh seed; on the 8th August he found blossoms which would not have appeared until twenty to twenty-five days later in Mississippi; in the intervals of rain he hoed up, ridged, and weeded his fields.

On the 18th some gun bullocks reached him.‡

On the 5th September he finds that his Cotton has "taken rust very badly, the leaves are turning red in spots"; the drought throughout this month continued, and he despaired of picking even half a crop.

On the 11th October he commenced picking Cotton: he found that his people would not pick more than from 7 to 10 lbs. per day, while a good hand in the States picks 100 to 500 lbs.: the little Cotton he gathered had been injured by worms, from one-fourth to half of each boll being discolored by them: but on the whole, the first field he sowed yielded a very fair crop.

---

* Mr. Finnie thus describes their appearance: "I walked to the compound and was surprised to see a lot of very small animals where I expected to see bullocks."

† "The Coolies are learning to plough well: and are becoming fond of their new plough: a great misfortune is that it takes two to manage it."

‡ Mr. Finnie complains bitterly of the carelessness and insolence of the "gentlemen drivers."

CSL

From 105 bigas sown with *American* seed he picked only 1,280 lbs. of clean Cotton: he had not, he thinks, sown early enough: both the rows, and the plants in each row, were set too far apart: many of the young plants were strangled by the ground having formed a hard crust after the rain, in consequence of all which, not more than one-eighth of the number of plants which ought to have been on the ground really stood there: the young plants were injured by an insect "that budded almost every stalk, causing it to shoot out long watery unproductive branches." Again, another insect deposited its eggs in each bud or flower: the worm produced from which either caused the boll to fall off without coming to maturity, or else stained and spoiled the Cotton: wherever a plant escaped the above dangers it produced largely.

He tried some *Sea Island* seed, which did not do well, producing only a few degenerate bolls.

He also sowed some *Bourbon* seed which produced well, but as it takes more than one year to come into yield, the plants were not in a condition to show if it would succeed or fail.

He also tried a few rows of "*twin-bolled, multi-bolled*" seed, a new kind introduced into the States in 1839; it was sowed too late, and the seed did not ripen.

Some *Cape de Verde* seed, sent him by Dr. F. Royle, was sowed, but also too late in the season: the few bolls which opened were very good: and he intends to keep the plants standing to see how they may turn out next season.

He had received some seed from Captain Frazer, of Cawnpore, the plants from which bore small bolls of very fine Cotton: but he thinks that it cannot be made profitable as a crop. He sowed 4 bigas with *native* seed, from this he picked 106 lbs. of Cotton: it was set in rows 7 feet apart, like American seed, and when the plants appeared, he had it thinned out as if they had been as large as those he was accustomed to: thus, although each plant yielded well, there were not half enough of them on the ground: he believes that this Cotton would greatly improve under careful culture.

As to the yield of his farm generally he believed that more than half his Cotton had been stolen.

About 340 bigas were sown by contract with *American* seed: from this 4,400 lbs. of clean Cotton was obtained; this suffered, of course, from all the dangers and misfortunes already described: much also was stolen, and although arrangements were made early enough, the sowing was not over until late.

Even when he had picked his regular crop, he found the plants kept on throwing out new leaves and forming new buds: he thought that if there was a little rain during the cold weather, without frost, much Cotton might be still secured.

He also found, with regard to the native Cotton, that it had shown greater improvement than he had at first thought: it not only continued yielding well, after all the plants of the ordinary crop of the country had died out, but the staple was considerably improved.

In December he broke up all the land he could, as a preparation for next year; he found the people crowding to work for him, and was in great spirits;* he found the people quickly learned to use both his plough and hoe; he mentions a case in which he ordered a batch of coolies to till a plot of ground with their own hoes, and on returning an hour after, found them using his in preference. This he considers "proof positive that the people are susceptible of wonderful "improvement: in a year or two they will do as much work as ordinary "negroes in Mississippi."

Before the end of the year a saw gin had been set up at Kotra, and was working satisfactorily under Mr. Finnie's superintendence.

---

* "Oh Mississippians," he writes, "well may you fear our enterprise here, when we "can muster so formidable a force for cultivating Cotton!"

CSL

Captain Bayles, in reviewing the proceedings of the first year, states that their late arrival, a bad season, and some misunderstanding in regard to their wants, had prevented the planters from effecting much beyond preparing for the future : he applies for sanction to erect some necessary buildings : he farther asks for a fixed allowance of Rupees 5,000 per annum for each farm to cover all charges save only rent and the planters' salaries. The Revenue Board sanction the expenditure as proposed, for the three years up to 1844-45.

The following is an abstract of the result for all four farms :—

	Acres.	Clean Cotton. lbs. per Acre.
Mexican seed for Government	164	23
Native seed ditto	5	76
Mexican seed on contract	452	22½
Mixed	104	40½
Total	725	25½

Samples of the produce were submitted to six brokers in England : the native Cotton was considered good of its kind, but not equal to best Surat : the American equal from good to good fair upland of American growth : the average of the valuations were, for the former 4½*d.* per lb., for the latter 5¾*d.* per lb.

The Cotton actually sold in Calcutta at 4·08*d.* to 4·35*d.* per lb. for the American, and 3·50*d.* to 3·67*d.* for the native.

The cost of the four farms, exclusive of salaries and rent, had been on an average Rupees 2,014 per month for all.

Operations in 1842.

In the June of this year Captain Bayles died at Cawnpore, and it is certain that from the peculiar relations existing between that officer and the Government on the one hand, and the planters on the other, he was a very severe loss to the experiment : his presence, however, could not have altered the general results.

CSL

MR. BLOUNT'S NARRATIVE.

Mr. Blount's journal for the early part of the year seems to have been mislaid at the time of the transfer of the records of the Superintendent's office to Mr. C. Allen, who succeeded Captain Bayles in charge of the four planters. But in July he reported that up to the beginning of June nothing had been done on his farm, except the cultivation of some sugar-cane of the Otaheite and native kinds, which he had planted in February ; white ants had attacked the former, and destroyed at least half the crop, but had not touched the common kind growing along side of it.

June.

About the middle of this month sufficient rain fell to allow of his sowing 100 bigas of Cotton, after which the ground became so dry as to force him to discontinue.

July.

About the 7th of July very heavy rain commenced to fall: this continued almost without intermission until the 26th ; he continued sowing in the rain until the ground was unfit to receive the seed.

He remarks that, had he anticipated so much rain, he would have sowed earlier and on sandy soil : that which he had chosen was the *Mar*, or rich black soil, which cannot be worked during rain, nor until several days have dried it after a heavy fall : as a rule, he would nevertheless prefer it.

Up to the end of this month he had sowed 431 bigas, 257 with American seed, 64 with seed from Jubbulpore, and 120 bigas with the ordinary country kind. He was still planting, and hoped to get 600 bigas under the crop.

August.

On the third of this month he stopped planting, and the whole of his crop was above ground by the 15th : that first sown did not appear to suffer from want of moisture until about the 20th : the plants all began to assume a burnt-up and withered appearance about this time, and by the end of the month he thought that the prospect was no better than it had been last year: no hope, he thought, remained of a crop which would pay for its cultivation: from 200 bigas he expects to pick a man of seed Cotton each (that is about 80 lbs. of clean Cotton per acre); but on 300 bigas the plant was too small, and its growth had been too long checked to yield more than a very scanty crop.

In May Captain Bayles had circulated among the planters questions to elicit information as to what they expected to effect with the 5,000 Rupees granted for the maintenance of their farm in each year.

Mr. Blount hoped, he said, to keep up fifteen ploughs; he does not think that on the allowance he can sow more than 350 bigas of Cotton, "and about the same quantity of rubbee."

Thirty mules or horses, would, he believes, do more work than 40 pairs of bullocks: he estimates as follows his outlay for twelve months:—

Feed, &c., of 40 pairs of bullocks	Rs.	1,680
Wages of coolies	"	1,305
Pay of other servants	"	1,668
Contingencies	"	347
Total,	Rs.	5,000

Mr. Blount during the year represented to the Superintendent that it would be well to try some more humid climate than that of Bundelkhund, and suggested Dacca; he was authorized to make a tour of inspection, which he did early in the following year.

MR. TERRY.

Mr. Terry has left no record of his proceedings during this year, as far as I can discover: the general statement of the year's cultivation shows that he was not idle, but he did not report progress. In answer to the questions above alluded to, he stated that he could, on the allowance granted, maintain thirty ploughs, and plant 500 bigas of land: he thought twenty-five mules would be sufficient to do the work: he deprecates anticipations of this kind: during the whole of last year he had only six weeks of damp weather, and during no more than four weeks of that period could the ploughs be worked. Twenty-five good mules or horses would, in America, serve to till 450 to 500 acres; but he believes that in India they could not do more than 250 acres; he believes they would do as much as forty pairs of bullocks.

He, too, desires to be moved to a climate with more moisture, more equably spread over the different seasons.

MR. MERCER'S NARRATIVE.

On the 4th of August Mr. Mercer had closed his season's planting: 295 bigas in all, 200 in Mexican seed, 19 in Amraoti seed, and 76 in common native seed. He had removed from Rauth to Hummeerpore, and had suffered inconvenience from the laborers, whom he had last year taught, leaving him to return to their village: this circumstance, and the badness of his cattle, delayed his sowing materially. Nearly all his Cotton came up well, but towards the end of August began to show the effects of the hot weather. He does not believe that Bundelkhund will do: he suggests Dacca, also the Nerbudda valley.

In September the American and Amraoti plants were attacked by white ants, and also by a worm in the stalk (he does not speak of the pods as injured). Mr. Mercer left Hummeerpore in December on his way to Bombay, and the observations he recorded on the country he passed through are noted elsewhere: he was the first of the planters to retire from Bengal, but his name appears for many years subsequently in the records of Cotton-planting in other parts of India.

MR. FINNIE'S NARRATIVE.
January.

During the month of January Mr. Finnie was occupied in preparations, principally ploughing and cleaning the ground: he employed both the American and native plough: he also ginned the Cotton of last year's crop, and found the plan of working the gins by coolie labor more expensive than it would have been had he had time to set up the machinery for working it by a horse; he complains of the dishonesty and idleness of his overseers, and the laziness of the coolies.

February. Ginning and general farm work progressed: corn was cut and cleaned.

Mr. Finnie, when called on to offer his remarks on the allowance sanctioned, in general terms approved of the plan, but thought that the cost of the permanent establishment of men and cattle necessarily employed on the present scale, would cause the cost of production to be excessive, unless a larger sum was allowed for labor, &c.

He proposed to maintain thirty-five ploughs.

He announced his intention of exceeding the allowance so far as to spend nearly the whole of it on the sowing, and hoped thus to get 1,500 or 2,000 bigas sown. He wants ten good mules; these or horses could be cheaply employed; with ten mules and forty yoke of oxen he will have enough cattle.

March. Mr. Finnie was in great hopes of success; he thought that if he could command capital as Cotton planters in America can, he could "turn the Doab into one vast Cotton field." He was occupying himself with preparing ground for Cotton, and with his grain crop; he thought that the latter must have cost him nearly its market value, in consequence of his having no carts to fetch it home on, and being obliged to have it carried by coolies for more than a mile; the pay of these coolies ran away with the profits.

April. He commenced building sheds, cleaned his grain, which he got all housed; he regrets not having carts; his cattle are idle, and plenty of manure is lying about the village, which he would spread over his fields if he had the means of doing so: Cotton which he had planted on the 20th March had not grown well; it was stalky and weak, and he believes had been sown too early.

He had tried irrigation with some Cotton planted in his garden; it throve amazingly, and he thought that wherever there was not frost enough to kill the plant, irrigation would keep it bearing all the year round.

He praises the readiness with which his laborers have taken to the hoe and plough, and ridicules the idea of their being hard to manage: he occupied himself with building: he regrets that no one has been sent to him to learn the American system of agriculture.

May.

He considers this month the beginning of the Cotton year; and anticipates complete success for his Cotton crop this season; he is only surprised that the English market has ever sought its supply elsewhere than in India; "it, however, proves the utter uselessness of scientific men. "Scientific men may form some distant idea of what the plant "requires, but their utter ignorance generally of all practical application "has hitherto proved and ever will prove their efforts abortive: "how many years have elapsed, and how many thousand pounds have "been spent in scientific experiments upon Cotton. With printed directions before them, scientific men have been floundering in the dark, and "are likely to continue to do so." His Cotton of the 20th March was now looking well, and had improved.

On the 6th he had a storm.

He found burning bricks very troublesome.

June.

His ground was now all ready for rain: but he looked for it in vain during the early part of the month; on the 19th he assembled his work people, a little having come down on the 18th: he was very anxious to get a fair proportion of his seed in the ground before much rain had fallen.*

---

* Mr. Finnie describes the first day of his sowing season thus :—" After some bluster the "coolies got their bullocks yoked, but they were too anxious, and went helter skelter, some one "way and some another, some bullocks running away with the plough, others lying down and "refusing to move, but those I bought and broke in last year moved like a thing of life, "knowing their business."

CSL

After preparing the ground he commenced sowing, but on the evening of the 20th, the second day of this work, his coolies came to him and refused to go on, demanding some back pay which he had intentionally retained, in order to enforce attendance : he was in despair ; it was the crisis of the season, a few days might be the ruin of his hopes : in vain he tried every argument he could think of to induce them to give in : at last he "resorted to the desperate alternative of trying what virtue there "was in boxing the ears of the ring-leaders, this he accordingly did "coolly and deliberately, until they rang again, which soon convinced "them."

After all, only a slight sprinkle of rain came : and up to the end of the month the planting, which he nevertheless persevered in, was difficult, besides which, the extreme hardness of the ground greatly endangered the young shoots which began to spring up.

July.

He was still occupied in ploughing, manuring, and planting, and above all, in longing for rain. He soon had 600 bigas sown with Cotton, besides 50 with Indian corn, and 50 bigas more ready ploughed and manured to receive more Cotton seed. But he about this time began to despair of ultimate success : he perceived that 300 bigas of the ground sown would have to be ploughed up again, and resown : on the 10th a little rain fell.

On the 12th a down-pour, which continued for several days. If, he says, rain like this had come about the 1st June, followed by occasional showers, the farm would be the finest Cotton land in the world.

About the 19th however, the crops looked better ; he began to "scrape," hoe, weed, &c. "Even should the American Cotton fail in India, "of which there is, however, now no danger, there is equally good "Cotton now indigenous to the country :" this alludes to some samples sent him by Mr. F. D. MacLeod, from Jubbulpore.

On the 21st he says he has 400 bigas of Cotton beautifully up, which badly wants hoeing and weeding, but which the rain prevents him from touching.

On the 25th things looked hopeful, and he was working away, ploughing, scraping, and re-planting; but on the 26th his coolies all struck work: he caught some of them, and others then returned: he found their desertion had been caused by the chowdry, with whom he had once before quarrelled. Most seem to have returned, but as he determined to sow as much Cotton as he could, he employed many new hands.

The month closed in hopes and fears.

August.

Much of his Cotton "looks beautiful, and is growing freely": still the surface of the ground was baked so hard as to be impervious to the hoe, and he knew that unless it was broken up the plants could not grow: he had great trouble in getting labor; men after working for a few days would go away.*

He broke in his own horses to the plough, and found that one horse and one man go along two and a half rows of the Cotton, while two men and a pair of bullocks are ploughing one..

He was obliged to increase his wages: and by this means kept his crop pretty well cultivated: but if the drought continues, all must perish.

He was, during the course of the month, tantalized by a few dropping showers, which were insufficient for his plants.

On the 24th he seems to have almost given up hope, for he says that even should rain now fall, although it might save the plants alive, they

---

* "I have never been fully able to appreciate the word *liberty* upon which our 4th July "writers expatiate so eloquently, until I came to this land of pure sunshine, where it is "enjoyed to perfection. It is a luxury to us poor hard-working Americans to see 500 "sleek fat niggers at one sight lying in the sun, or on the ground under the shade of a tree, "with their stomachs full of parched grain, or of melons and gourds."

CSL

have been too much stunted by the drought ever to bear a fair crop: he finds, too, that white ants have been at the tap-root of many of the plants, which, when so attacked, die at once.

He kept on cultivating, however, but determines to abandon this part of the country, as he sees that the seasons are too uncertain for the crop ever to be made a profitable one: he wishes to see the Ganges Valley in Lower Bengal, Rungpore, and Dinajpore, or lower down, near Dacca and Patna.

September.

He keeps on hoeing, for the grass grows, although his Cotton can't; he has stopped ploughing, and given up all hope; "all the forms, "flowers, and young bolls fall off as soon as they appear, or the few "that remain are poor, miserable, stunted little things, in consequence "of the excessive drought and hot winds."

On the 4th, 5th, and 6th rain fell, and again on the 9th: the Cotton plants looked refreshed, but he fears they can't now come round: still he keeps weeding and hoeing.

On the 14th rain again fell; since the rain he has been ploughing again, as the ground now admits of it: he hopes that this may check the decay of the plants, and kill the insects, which have now begun to attack them: those bolls, which had become too diseased to revive, were beaten off by the first showers, and the ground was strewed with them.

On the 21st he noticed that the plants had not derived that benefit from the rain which he had hoped they would; the leaves were crisp and half withered, and the stalks shrunk and dried up.

On the 29th he writes, "I have done enough work this year to have "realized a crop of 350 bales of 400 lbs. each, and should have done so "had the season been favorable, which would have given a handsome "profit, but if I now make thirty bales I shall be thankful."

There is no record for October, and on the 1st November Mr. Finnie tarted on a tour of inspection to the west.

Mr. Finnie was to report on the capabilities of the Doab and Rohilkhund.

Mr. Blount was to visit Goruckpore and the adjoining districts.

Mr. Mercer's services were transferred to Bombay, and he was to report on the country through which his route lay.

Mr. Civil Surgeon Sill took charge of Mr. Mercer's farm, and Mr. Terry was to look after the rest of the crops.

The general statement for the cultivation of 1842 stands this:—

Kind of Cotton.	*Hummeerpore, Mr. Mercer,* 127 Acres.	*Somirpore, Mr. Blount,* 216 Acres.	*Chauk, Mr. Terry,* 260 Acres.	*Kotra, Mr. Finnie,* 405 Acres.
	lbs.	*lbs.*	*lbs.*	*lbs.*
Mexican	1,317	1,260	2,412	6,233
Jubbulpore... ...	1,035	1,400	3,299	3,093
Native	184	565	1,560	......
Total ...	2,536	3,224	7,271	9,326

Total for all four farms being 22,357 lbs. in 100 bales.

Besides which, there were subsequently recovered,

Of Mexican	2,849 lbs.	
Native	114 „	from all four farms.
	2,963 lbs.	in fifteen bales.

Bringing up the total to 25,320 lbs., which were sent to England.*

The fifteen bales last named were thus classified: six were "Mexican," six were called "first-class American," three "native and inferior."

---

* Of the sale of this Cotton I have not been able to discover any record.

CSL

A fixed allowance was, as we have seen, assigned to the farms: but I cannot discover any account of the sums actually spent in each; these can scarcely have been the same in each, for Mr. Finnie turned out nearly four times as much Cotton as Mr. Mercer: under these circumstances no calculation can, of course, be made of cost of production: Mr. Mercer may not have drawn all his allotted money, and Mr. Finnie may have exceeded his allowance.

If it cost Rupees 20,000 to grow 25,320 lbs., the price of the Cotton at the farms was about 19*d.* per lb., exclusive of superintendence.

Mr. Allen bore testimony in the strongest terms to the untiring exertions of the planters, and it is impossible to read Mr. Finnie's reports without feeling full confidence in his zeal at least, and pity for his disappointments.

Lord Ellenborough was at Allahabad in May 1842, and had an interview with Captain Bayles and Mr. Finnie. He wrote to the Court that he not only thought this experiment was likely to fail, but that he did not believe the object of Government would be realized by the establishment of such farms at all. "The object is not merely to "improve the Cotton of India, but to grow that Cotton, so as to under-"sell the American in the English market." The way to effect this is to import gins of the largest size in great numbers, to set one up at the cutchery nearest each of the known Cotton fields; and "close to each "place where the machine might be erected there should be a small piece "of Cotton ground cultivated with seeds suited to the locality"; ploughs and other implements might be kept at each of these places for sale or occasional distribution.

In a letter dated 28th September 1842, the Court reply; they recapitulate the Governor-General's views and advice, and the reasons he assigns: they go on: "The important objects contemplated by us at the "commencement of this undertaking were manifold, and are fully "detailed in our despatches: after maturely considering the reports of "Captain Bayles, as well as of those most competent to form a correct

GSL

"judgment on this subject, we resolved that the best mode," &c.* In a subsequent part of this letter, referring to what Lord Ellenborough proposed about machinery &c., they proceed: "Had our object been directed "merely to the instructing the natives in the art of cleaning their "Cotton, your project might have been deserving of more immediate "attention: but the inutility of applying so expensive a plan to Cotton, "which has been neglected through all its stages of cultivation, must "be manifest. Under this view of the subject we shall not be prepared "to sanction any immediate departure from the plans and operations "now in progress."

In December 1842 Dr. F. Royle submitted to the Court some remarks on the subject of the experiment. Although the exotic Cotton had failed in Bundelkhund, he justifies the selection of that place: he quotes the Agricultural Society, Mr. Bruce, Mr. Vincent, Colonel Colvin, General Briggs, &c. He suggests a trial within the influence of the Ganges Canal.

He says, that perhaps the Indian methods of cultivation are better suited to the climate than those practised by the Americans, which were formed on an experience gained in a very different one†: the experience now gained might enable the planter to adapt his methods to the differences of soil and climate‡: he approves of their being given an opportunity of inspecting new parts of the country, and making each a selection for himself.

Operations in 1843.

The Governor-General reports to the Court that the arrangements for this year were as follows:—Mr. Terry was to remain at Hummeerpore, where Mr. Frost (a mechanical engineer, lately arrived in India) would set up a sixty-saw gin: this last named gentleman would then proceed to Kosee, a great mart in the Muttra district, and set up another sixty-saw gin there. "It is my intention to put up gins also in other quarters."* Orders have been issued to send one to Nursingpore. Mr Finnie will superintend the working of one at Agra, where he will also manage a model farm under the immediate superintendence of Government, and a plot of land has been allotted to him for that purpose on the banks of the Jumna, near the city.

---

* Here follows a statement of the proceedings then in progress.

† Looking at all this history with the light of experience, it certainly seems amazing that this apparently obvious consideration was not more prominently put forward and acted on.

‡ Mr. Mercer (see ante) testifies to the fact that the natives do this, but I have not found any record of the planters making any alteration in their system, which was the same (as far as we know) in Dacca, Rungpore, and Agra.

Mr. Blount is to establish an experimental farm in Goruckpore, near the station: and Mr. Mercer has left the Presidency.

MR. TERRY, SOMIRPORE.

The Kotra farm was made over to the Collector of Cawnpore: Chauk to the Deputy Collector of Calpee; and the Bundelkhund experiment confined to Somirpore, was now placed in Mr. Terry's charge.

On the 17th October the Acting Superintendent submitted an application from Mr. Terry to be removed to a more favorable climate: at the end of December that officer had an opportunity of inspecting the farm: he reported most unfavorably of the climate of Bundelkhund, in its effects on the exotic Cotton: the results of the season's operation were most unsatisfactory, especially as regards the Mexican seed: one bale was the produce of 100 bigas, which had been sown with it: fourteen bales, however, of native Cotton had been obtained from 130 bigas of land sowed with the common seed.

In compliance with his own wish Mr. Terry was transferred to the Government of Bengal, for employment in Rungpore.

Of the above fifteen bales, the produce of the Bundelkhund farms in 1843, we have the following account:—In a letter dated 2nd July 1845, the Court acknowledges the receipt, per *Seringapatam*, of fifteen bales of Cotton forwarded by Mr. Lowther of Allahabad: the Cotton "was "reported to be of a good bright color, with very little leaf, but greatly "injured in the process of ginning: it nevertheles produced a price equal "to that obtained for the best Surats at the time of sale," namely, 3½*d* per lb., at which fourteen bales sold, one realizing 3¾*d*. per lb.*

---

* See letter, above quoted, from the Court, declining to sanction the establishment of machinery.

MR. BLOUNT, GORUCKPORE.

Mr. Blount reached Goruckpore on the 14th January: on the 24th he reported to the Superintendent, that after seeing all he could of the district, and by the advice of Mr. Collector Reade, he requested to be employed there: the climate (which was with him the first consideration) was, from what he had heard, well suited to Cotton: the rains set in early, lasted late, and there was almost all the year round much moisture in the air; examining what he could learn in detail, as applicable to each stage of the growth of the plant, he saw every prospect of success for the American varieties. He thought altogether that it was one of the most favorable districts which could be selected, both for the introduction of American, and the improvement of native Cotton: there were many landholders, both European and native, who, if superior Cotton be shown to be capable of successful cultivation, will quickly adopt it: the Collector offers him a plot of land, suitable for a farm, consisting of 118 English acres, near the station, and the property of Government: convenient buildings are also available at a small rent; should it, moreover, hereafter become desirable to extend the operations, more land could be obtained in the neighborhood.

As soon as the first rain fell (which was on the 25th of June) Mr. Blount commenced instructing his coolies in the use of the American plough; it was four or five days before they could handle it well. As soon as they had become expert at turning a deep furrow, he set them to make ridges for the reception of the seed: there was not, however, enough rain thoroughly to saturate the ground, so that the ridging went on but slowly, and much of the ground could not be stirred at all.

---

* I have not been able to find any record of the prices fetched by the produce of 1841 or of 1842, which it would nevertheless be very interesting to possess.

Two casks of freshly-imported American Upland seed, obtained from Mr. Lowther, did not germinate.

Most however of the American seed, which he was fortunate enough to get sowed early, grew well: he had the crop thinned, and cleared of grass, and before the end of July had ploughed and ridged the young plants, which, since some rain that fell on the 27th, "grew finely, and were thriving, and healthy."

The native Cotton seeds, of which he was trying several kinds, had been sown later, and were not above ground in July.

On the 1st August he had ceased planting, "as I think the season too "far advanced for Cotton to turn out well, if planted at this time, even "under the most favorable circumstances."

He then had about 80 acres under exotic Cotton, "most of which is up, but not a good stand, that is, the Cotton has come up too scattering."

On the 30th September Mr. Blount reports that he had succeeded in getting the following area under cultivation :—

American Cotton	536	acres.
Banda	227	"
Jubbulpore	89	"
Goruckpore	15	"
	876	acres.
Prepared, but not sown	287	"
Total area of farm	1,162	acres.

He regrets having to report that the American Cotton plant must be considered an entire failure at this farm: he did not believe he could correctly determine to what causes this unhappy result was to be attributed: judging from the many experiments which had up to that

CSL

time been made in various parts of India, none of which had met with any thing more than a partial success, the only reasonable conclusion seemed to him to be that the plant is unsuited to the climate of the country.

The seed principally used by him was procured from the Bundelkhund farms. This was its third season in India: if it ever was to be acclimatized, it would in three years have shown some indications of a disposition to adapt itself to the climatal conditions of the country: "so far from this being the case, each successive crop has only shown an "unchecked and greater deterioration, both in quantity and quality of "produce."

In Bundelkhund the failure had been accounted for by the extreme heat of the sun, by the scarcity of rain, and by the prevalence of the hot winds, "but in this district the plants had suffered from none of "these incidents, and still the result of the cultivation is the same as "on the Bundelkhund farm last year."

The soil of his farm here was poor and sandy, but this he believes had nothing to do with the failure: the natural result of planting in poor soil would be that the out-turn would have been less than in a richer one, but there seemed to be some quality inherent in the soils of all kinds here, and in the climate, or in both, which he has failed to discover or explain, but which forces the American Cotton plant to maturity at too early an age. "At this time, only three months after planting, when "the plants should be in full vigour, they appear entirely exhausted: "all the first foliage has died and dropped off: and the plants are now "putting out a few sickly shoots from the top bud, which may produce "Cotton, but such a result is scarcely to be hoped for."

That part of his crop which stood on the best soil in the farm grew very vigorously: the plants had sprung up into stout bushes, flowered, and produced young pods plentifully: they were green and flourishing up to the 15th September, at which time the bolls commenced falling

CSL

off, and had shed to such an extent within ten days as to destroy all hopes of a crop.

Besides this, some of this same part of the crop thus favorably circumstanced as to soil, had suffered greatly from worms, "or caterpillars, "which eat into both flower and fruit, causing a great deal of damage, "for every pod touched by them immediately falls off."

His crops of native Cotton were, however, in a thriving state: the plants, now grown 3 to 5 feet high, were covered with flowers and young fruit: even these he did not think would yield as good a crop as the same kinds had done the previous season in Bundelkhund, for they too, seemed to shed more flowers than he had ever before noticed them to do: notwithstanding which, he hopes for a fair harvest.

On the 1st of December Mr. Blount reports again.

The blossoms and young pods continued to fall until scarcely one remained, and the plants were, to all appearance, dying.

The young shoots, however, above mentioned as not promising much, for the most part continued to improve, and finally grew so well that by the end of November they had "more blossoms "on them, and there was quite as good a prospect as at any time during "the season."

He now began to fear the frost, which, if the plants can escape, there is he believes, a good prospect of a fair crop. "The plants have suffered "from want of moisture, and I am at this time irrigating them, and "will wet as much of the fields as I can procure water for: this is a sure "preservative against frost.*"

His Banda and Jubbulpore Cotton fields, which looked unpromising at one period of the season, had suffered to such an extent from a storm of rain and wind in September, that the whole of their fruit was destroyed: and although the plants were still blossoming at the end of

---

* It is not clear whether this latter statement is given on the authority of Mr. Blount, or of Mr. Reade, who forwarded the reports to Government; *à priori* it seems monstrous.

November, Mr. Blount thought they were too completely exhausted to permit of any hopes of a crop from them being entertained.*

He employed his laborers in manuring the lands; he had carted out a good deal up to that time, and hoped to procure enough for the greater part of his farm.

He wished to procure some Egyptian and Bourbon seed, which he proposed to sow in January, and irrigate until the rains began.

MR. FINNIE,
AGRA.

Mr. Finnie was established on a small farm near Agra: the experiment was also to be extended to the ginning and packing of Cotton furnished on contract by the people about. Mr. Finnie says he found them willing to enter into the arrangement, and anxious to try any system of cultivation which promised a better return than they now obtained from their land, and he believed that if the American method proved on experiment to realize this result, it would be generally, nay universally, adopted.

On the 24th April a public meeting was held at Agra: it was called by Mr. Collector Jackson: all the Tehsildars of the district were present, and it was largely attended by the neighboring landholders. A saw gin was exhibited at work. The landholders expressed their readiness to supply any quantity of Cotton at the market price of the day, to be delivered at their own villages, or near them: but they declined to deliver their produce at Agra, on account of the excessive cost of transporting so bulky an article as seed Cotton to great distances: and when called on to fix a price, instead of taking the market rate as a standard, they insisted on a sum which would not, it was thought, leave any margin for profit.

Mr. Finnie was greatly dissatisfied with the machinery he found at Agra: he doubted if it would do its work; to obtain the best results many gins should be set up throughout the country, but even those here were not what they ought to have been: much money had been spent, but instructions as to the arrangement, &c., of the gins, had been disregarded, and he feared the result.

---

* I have not been able any where to discover any mention of the result of this crop, not even a mention of its ever having been picked; it would seem that some other disaster had annihilated it.

May.

He says he found that the ground on his farm was very poor, and he had great difficulty in obtaining manure for it: the wells, too, were in a very dilapidated state, and he had to repair them, as well as the buildings placed at his disposal.

On the 15th some bullocks which he had obtained, arrived in very bad condition: besides which, the ground was too hard for ploughing: some Cotton previously sown was, however, coming up well. He found it to his interest to pay some of his old coolies at a high rate, in order to retain them, as their labor was worth much more than that of new hands: Cotton was meanwhile largely contracted for, to be supplied at market rates.

On the 21st he had to give up ploughing on account of the hardness of the ground.

He is irrigating from wells, but he knows that cultivation carried on in that way by paid labor can't possibly pay.

His bullocks were now too weak even to cart manure in the heavy commissariat carts which had been supplied to him.

June.

He complains that a great number of oxen had been sent to him, and that they overcharge his expenses uselessly; he kept on manuring his fields, and having a little rain on the 20th, sowed some more seed, trying at the same time to irrigate as well as he could: the Cotton which he treated in this way was succeeding and promised well, but his fears predominate, and he scarcely hopes now for a satisfactory result.

All his work-people struck: they were a few days in arrears, and he had no money.

July.

The continued drought is killing his crop, a slight shower on the 3rd was of little use : he reduces his establishment, feeling now convinced that the farm can't pay its expenses : on the 8th a shower fell, and he commenced ploughing once more.

On the 11th heavy rain had fallen during the night, and the ground was too wet to permit of his touching the Cotton : subsequently however, he tilled it, and weeded a good deal.

On the 24th he went to look after some of the contract Cotton : he saw a good deal of it just coming up, but was greatly disappointed by its miserable appearance : the plants were themselves healthy, but the seed had been carelessly scattered, and the fields looked dirty.

A good deal of rain had fallen during this month, but there were torrents where showers were needed, and the result was bad on the whole. Only one of the landholders had engaged to cultivate under Mr. Finnie's instructions : after a very faint commencement he abandoned the proceeding, and utterly neglected both his American and Jubbulpore plants.

Many others were given seed of those kinds, but sowed them in the native way : what with neglect, bad cultivation, and the ravages which the white ants committed on the surviving plants, there had been a universal failure.

One man had taken an American plough, but he said that it would kill his cattle, and soon gave it up.

The produce of the farm was

On 16 bigas sown with American seed	...	120 lbs.
„ 65 „ „ „ Native „	...	1,172 „

"The produce of the land, as shown above, is indeed ridiculously small." In explanation Mr. Finnie says that, notwithstanding the badness of the soil and the drought, a very much greater quantity of Cotton had ripened, but that it had been stolen. "Taking all

CSL

"circumstances into consideration, I fear that no human means will now "make this part of the country produce the finer qualities of Cotton."

Mr. Finnie deprecates his apparent expenses being taken as the real cost of his experiment: he had been needlessly loaded with the cost of supporting a number of idle cattle.

Mr. C. C. Jackson, Collector of Agra, reported to Government on the results of the year's operations. The advances offered on Mr. Finnie's terms were taken only by two persons, one to the amount of Rupees 82, and another for Rupees 2,000: the season was bad, the Cotton crop generally failed, and these men were unable to deliver more than 23 mans of produce!

Mr. Finnie's farm consisted of 538 bigas; 20 bigas were sown with American, and about 200 bigas with seed of various other kinds. Mr. Finnie's statement shows the result: it may be considered a complete failure.

The entire expenses amounted to Rupees 12,293-3-7, exclusive of rent of land.

The assets were:—

Value of produce, Rupees 162-9-0; two houses that had been put into repair, one as a dwelling for Mr. Finnie, and one to receive the gins. Also some oats and other grain.

It had been intended, in addition to the produce of the farm, and to the Cotton, for which advances should have been taken up, that some Cotton should be purchased to be cleaned in the Government gins, and ultimately forwarded to England: but as no direct sanction was given for this outlay, the best time for buying in open market passed by.

Since the arrival of Mr. Frost,* a gin with a bullock wheel to work it has been set up at Kosee: and a wheel made in the Agra magazine propelled the gin on Mr. Finnie's establishment.

---

* This gentleman's appointment is mentioned in Lord Ellenborough's letter already quoted.

CSL

This closes the narrative up to the end of 1843: from the commencement of the experiment up to the date, the total cost is stated to have been Rupees 1,59,981-4-11. As has been before stated, no account is given of the sales which had been made of Cotton at different times in England; the sums received were, of course, insignificant, but an account of them would have been interesting as showing the value of the article produced.

Operations in 1844.

It was evident at the close of the year 1843, that all the hopes of the planters, and the expectations of the Court of Directors in sending them to the country, were doomed to disappointment: and all that remains to record is the gloomy close of the proceedings, which opened with such seemingly brilliant prospects.

MR. BLOUNT,
GORUCKPORE.

Mr. Blount occupied himself during the four first months of the year in preparing his ground for the crop: he carted manure; he expected to sow 59 acres at the farm near the cantonment. He had rented 6 or 7 acres lately cleared of jungul, 4 miles off, on which he intended to try American Upland seed: the plants of his last year's crop he intended to prune before the commencement of the rains, and allow them to produce again from the stumps.

Little could be done until June: the old plants were ploughed round, and well weeded: the new ground was broken up and sown: rain had fallen: the last year's crop was growing up finely and blossoming: the newly sown seed was coming up, and the farm was reported in fine condition, flourishing, well tilled, and free from weed and grass.

On the 1st of October Mr. Blount stated that he had delayed making any report until he could make a definite one: it was unfavorable. The season had been unlike that of 1843: there had been abundance of rain.

" At the first setting-in of the rains I had the old plants pruned, and " they immediately threw out vigorous shoots : judging from the quantity " of the flower and young pods, they promised to yield a most prolific " crop : but as in the previous year's experiments the fruit had dropped " off before arriving at maturity : this has not only been the case with " American, but with every other description of Cotton on the farm, with " the exception of the *Nurma* and *Kooktee* Cottons of this district, which, " I presume, must require a peculiar situation or soil, for on the sandy " soil of this farm it has not even blossomed."

The plants from seed sown that year were small and did not promise any crop at all: 5½ bigas of freshly cleared land, which he had sown with American and Jubbulpore seed, had grown finer plants than any as yet tried in Goruckpore : but they had been so injured by worms, that under the most favorable circumstances they can't be expected to yield fairly.

Some Bourbon and American seed had been sown in February, and the plants had been brought on by irrigation : these grew to a good size, but had not produced any flowers.

He suggests that his establishment should be paid off.

During the month of October " the plants revived, blossomed, " put out new shoots, and in a great measure recovered the damage " sustained from the insects and worms," so that on the 25th November the crop bore a very thriving appearance. Mr. Blount left the farm for a month, expecting that on his return he would have found the whole blighted by the frost ; he was, however, agreeably surprised to find that the plants had continued to improve, and considering the injuries previously received, he thought they would yield a very fair return : before the end of December a large quantity had been picked, and he expected thirty or forty mans more ; the American plants on the newly cleared land were, he said, the finest and most promising he had ever seen grown in India.

It would have been satisfactory this year no less than last, to have learned what the result was, how much Cotton was picked : of what kinds : which yielded best : whether the plants of second year's growth proved hardier, or less so : if in the final result the newly cleared ground was more or less favorable : but all these things are left unrecorded. Mr. Blount had for his object not to make investigations, but a crop, and even without the hearty testimony to his zeal recorded by Mr. Collecter Reade, the story of his operations contains abundant internal evidence, that if untiring perseverance could have secured that object, he would have succeeded.

It is easy, of course, to be wise after the event, but most persons who read the above account will perhaps be sufficiently interested in the question involved, to regret with Dr. Royle, that the trial was not proceeded with. Success seemed so near, each year the same phenomena were so regularly repeated, that it is difficult to escape the conviction that the cause of the mischief was not far to discover, and hard to reject the hope that once known it might have been overcome or evaded. Such, however, is the result as it stands, and such as it is, we may dwell on it before turning once more towards Agra. Mr. Blount was the least unsuccessful of the planters, as far as Bengal is concerned at least, and he writes as follows in one of his last letters:—" Unfortunate as have been all the experiments " under my superintendence, not having met with even partial success, " only in one season, that of 1841, in Bundelkhund, I am still of the " opinion that the experiment will be attended in some other portion of the " country with success. But to secure what I suppose one of the prime " objects of Government, a more extensive and better cultivation of the " Cotton plant, it will be necessary to change the mode of conducting the " experiments : by giving advances to the natives for cultivating, with " an agreement on their part to pursue the system of cultivation " pointed out by the planter.* The ryot thus becomes interested, and

---

* Mr. Blount, it is thus evident, had not had his faith shaken in the system he had learned, nor in its equal applicability to all cases alike.

CSL

"at the same time a more extended cultivation is secured than could "be carried out by any single planter. The establishment of machinery "for cleaning Cotton raised by natives would, I am persuaded, go far "towards improving the character of that Cotton, which is not always "so very inferior an article."

Mr. Finnie,
Agra.

I find no report written by Mr. Finnie himself, referring to any part of his career during the years 1844-45. During each succeeding year his reports had become less and less voluminous, as his hopes declined: and Mr. C. C. Jackson, Collector of Agra, is the historian of his last attempt to carry out the experiment. This officer, writing in May 1845, reports that for the year 1844 Mr. Finnie's farm had been reduced to 115 bigas of land; his establishment of bullocks and servants had been at the same time proportionably cut down; the cultivation resulted in failure.

This Mr. Finnie attributed, in the first place, to the poverty of the soil, which was sandy, and liable to inundation, to the detriment of the crop.

Mr. Finnie also stated that cultivation by paid labor could, under no circumstances, be profitably applied to Cotton in that part of the country: this remark Mr. Jackson thought, to some extent, true, although "more attention, and a longer experience of the natives than Mr. "Finnie possessed, might have ensured successful results from the "Cotton farm. Mr. Finnie arrived with a large cargo of American "ploughs and hoes, and endeavored to introduce here precisely the "same kind of cultivation as that pursued in America."

Mr. Jackson speaks of the great cost incurred in the deep ploughing, the regular sowing in lines, and in forcing the laborers to work with the hoes in a way new to them. He does not think, whatever advantages may be gained by these modes of treating the crop, that they compensate for the additional cost they entail, and he doubts that the advantages are real, at least under the conditions of soil and climate obtaining in the Agra country.

He believes that the natives can grow Cotton in their own way better than the planters can in theirs, and states in confirmation of this view, that one of his Tehsildars sowed some of the American seed in the native manner,* which throve well, and produced Cotton pronounced by Mr. Finnie to be "equal to some of the best Amerian produce," at a cost showing a slight profit (at Agra market rates for the Cotton), while Mr. Finnie's own farm, expensively cultivated, failed to do the like, nor could it, he says, "be expected that foreigners coming from a country at "a distance of half the circumference of the globe should make any "kind of agriculture a source of profit, until they had become "acquainted with the seasons, the soils, and other peculiarities of "the country. That kind of experience is acquired after years "of care and frequent losses—yet the Americans have attempted to "introduce into this country the same system of Cotton cultivation "which was found to succeed in their own, with a different climate "and different soils, while new implements of husbandry were placed in "the hands of the laborers." He is not surprised that failure should ensue.

Establishments for ginning and packing Cotton were sanctioned at Hatras, at Kosee, and at Bah; Cotton of superior quality was purchased to keep these working, and a little above the market rates. Mr. Finnie had, until he resigned, charge of a similar establishment at Agra, but he did not succeed in its management as well as Mr. Frost, whose zeal and abilities Mr. Jackson highly praises: the Cotton which had been cleaned was being prepared to be sent to Calcutta.

The expenses already incurred in the purchase of the machinery and in setting it up suggested that it ought to be maintained, and he proposed a small establishment for that purpose.

---

* A detailed report of this experiment is given in Part III. of this work.

GSL

This was sanctioned by the Lieutenant-Governor, and Mr. Mackenzie was engaged to superintend.

In August 1845 the Governor-General in Council forwarded this proposal for ultimate sanction, and referring to the experiment of the four American planters in Bengal, writes thus :—" We are of opinion that it " does not follow from the disappointment experienced by the American " planters, that superior Cotton cannot be obtained for the English " market from well selected soils in these provinces."

The Court in reply, writing in December 1845, concur in the desirableness of continuing the experiment on the scale proposed, and add, " We must, however, express our disapprobation of that portion of " Mr. Jackson's report, which in effect condemns the entire system of Cot" ton cultivation, which it was our desire to encourage and promote. " The experiments were not undertaken by us without full and careful " consideration, but no successful result could be expected, without the " cordial co-operation of the several local authorities under whose super" intendence the Americans might be placed, and we are satisfied that " Mr. Jackson has underrated the qualifications of the American " planters for introducing an improved system of culture into India."

Mr. Jackson evidently thought that it was not, so far as India is concerned, an improved system.

Such was the experiment of the four American planters: it cost from first to last Rupees 2,07,593, less whatever the Cotton sent to England may have sold for : if the stake be considered large, it cannot be pretended that the prize was an unworthy one.

The Court of Directors had originally thus stated their object : it was notorious that Indian Cotton was of inferior quality, as it appeared in the English market : it never would be bought there as long as American Cotton could be procured, but small quantities of Cotton grown in India, whether the produce of native or exotic seed, occasionally reached England of a quality which the spinners stated to be such as would

CSL

meet a ready sale, if largely supplied : the general impression was, that such samples were garden produce. On the other hand, the Court had it on the best authority, that no very special care needed to be applied, and that there were many places where any amount of such Cotton could be raised by ordinary judicious field cultivation : they were at the same time aware that the Cotton of commerce is very carefully grown in America, although produced in large quantities, and it seemed natural that those who so grew it there, would have a fair chance of similarly growing it in Hindustan, isolated efforts, on a small scale, had however notoriously proved useless. On this view they formed their plans : the joint efforts of the four farmers in Bengal (and elsewhere in India) would, they anticipated, send home a quantity of such Cotton as would draw attention in the market to India as a source of large and regular supply, and, it was hoped, show capitalists and speculators that Cotton could be profitably exported thence to Europe : the fact established, its application in practice on a large scale was certain to follow : and the benefits to be derived were neither doubtful nor insignificant.

Having once determined on this view, the Court never wavered : the trial was made ; it had every chance of success, and it failed ; but there nevertheless appear originally to have been many and strong reasons whereon to found hopes of success.

There were, however, many points which, had they been clearly before the minds of the first originators of the scheme, might perhaps have either modified it, or else caused its total abandonment ; these suggestions came late, and it was *unquestionably* wiser consistently to carry out a definite plan than during its trial to waver in its execution.

Lord Auckland suggested that a scientific determination of which kind of Cotton was really best suited to which soil and climate among the many known in British India, would have been a judicious preliminary. Mr. Prinsep thought that capitalists and speculators would be little likely to pay attention to the results of an experiment, even were

CSL

it successful, which had been confessedly made under abnormal conditions.

Lord Ellenborough wished to abandon the large farms, and contract for and gin Cotton grown by the people, encouraging them the while by prizes and instruction.

Mr. Jackson thought the American systems of agriculture altogether a mistake in Hindustan.

But all these suggestions came after the Court had decided on its course, and all were alike set aside.

The experiment failed, as we have seen; but it would be unjust to expect to find among its results what was never intended should be found there, namely, facts and opinions useful for future application. We may regret, for instance, that Mr. Blount has told us absolutely nothing about what his experience must have suggested to him in connection with various kinds of Cotton, and kinds of soil, but he is in no way blameable for not doing so. Mr. Jackson criticizes Mr. Finnie, and, indeed, with much show of reason, for not altering his methods to suit the circumstances of the country and the people, but he was not sent to India to do that: he came, on the contrary, to prove that Cotton could be grown here on the American system.

Every one interested in the result will determine for himself whether this was incapable of demonstration, or whether, being demonstrable, those who undertook the proof failed of their own fault to demonstrate it.

MR. J. O. PRICE.

1843. In August 1843 the Governor-General informed the Court of Directors that he was watching with anxiety the progress of the experiment then being made in the North-West Provinces; and saw with regret that it had to contend with difficulties which were occasioning disappointment;

CSL

he thinks, however, that there were grounds for anticipating favorable results in other places. Dacca was such a place: theoretically it was eligible, its soils possessed the constituents considered desirable: practically it had been from time immemorial the best Cotton-field of Bengal. "His Lordship in Council, therefore, anxious to adopt the "most effectual means to develop the capabilities of the country, has "resolved to depute an individual to the district of Dacca for the "purpose, in the first instance, of examining and reporting fully on "the localities best suited for the growth of Cotton, and he has selected "for the duty Mr. J. O. Price, a person thoroughly acquainted with "the plantations in America, and conversant with all the circumstances "connected with the production of Cotton of the best description."

In January 1844 His Excellency stated that in addition to this survey of the agricultural capabilities of Dacca, he is "desirous of introducing "an experiment for the improvement of Cotton cultivation in that "district, and that a quantity of American Cotton seed had been placed "at Mr. Price's disposal to enable him to commence planting."

Mr. Price reports his proceedings for November: he had been at Luckipore: and regretted that he had not been on to Hattia and Sundeep; he had however inspected much of the banks of the Megna.

December.

Early in this month he received two parcels of New Orleans, and one of Bourbon seed; these curiously enough, considering that he was deputed "for the purpose of examining and reporting fully upon the localities "best suited to the growth of Cotton," he had sown in several places which he had not himself been able to visit. He sowed some also himself, and considered it as an experiment on late planting, which would test the disadvantages of sowing at that season.

January 1844.

He proceeded up the Bunsee River: the inhabitants generally grow Cotton there; he found a triennial Cotton plant cultivated, which was then loaded with bolls:

the staple was fine and silky, and the produce worth 12 annas, or a Rupee per man more than that of the common annual kind.

On his return he found the plants from his last month's sowing in Furreedpore and Dacca suffering from the cold.

He found Cotton extensively grown on the Delessury and Luckye Rivers. He prefers the spring season for sowing.

February.

He visited Surreemuddi on the Megna, where he sowed a biga of land with American and Bourbon seed; it came up well, but he fears for the effects of the inundations. He visited one of the places not yet seen, where some of the seed first received had been sown for him by Messrs. Wise, Glass and Co.: very little of it had come up: the soil was ill-chosen.

March.

He visited the fields on the Delessury, where he had sown seed: in both places the Cotton had suffered much from want of rain, as the soil is not there retentive in moisture.

He determines to sow in October, but he also intends sowing during May and June in the stiff red soil of Bowal, Dumroy, and Capasia.

April.

He visited Cossimpore, which he found to resemble the above places, as regards general conditions of soil and elevation.

He thence proceeded to another of the places where the first seed had been sown for him; it had lain long without germinating, and was not worth cultivating.

One of his fields on the Delessury is now in fine condition: the plants covered with healthy bolls. His crop on the Furreedpore side of the river had been destroyed by cattle.

May.

Mr. Dunbar, Commissioner of Dacca, reported to Government on the state of the manufacturing trade in that place; he also discussed the question of Cotton-growing in the district; he advises that the villagers should be visited by the agent: encouraged to make a gradual change in some particulars, where their methods may be faulty: given seed of different kinds, and if they seem willing to use them, a few agricultural implements; advances might be tried, and even occasionally loans: but above all things—and without this, he thinks all must prove useless—their produce must be bought of them at once, at fairly remunerative prices, and paid for according to quality; discrimination in this last particular, he considers, as the essential element of success.

He believes that, as a speculation, this would pay; sum pât and safflower have rapidly attained a great spread of cultivation, simply because they pay the grower: let the villagers once see that it is to their interest to grow Cotton, and it will not be easy to place a limit on the amount of the supply.

Mr. Price visited Sonargunge: the Cotton cultivation once carried on there has been abandoned: a villager there had sown some American seed in February: and the crop looked very well.

His field at Surreemuddi had not been well tended in his absence: and every boll had a small red worm in it.

A field on the Delessury also looked very well; but a gale of wind, which prevented his going on to Mymensing, as he had intended, destroyed this crop.

He wishes to begin at once to make preparations for a regular farm. as he is now convinced that no sowing ought to take place after October.

June. Mr. Price went to Dumroy to sow some new Orleans seed just received; he wishes to rent lands on the Banar River for his farm: he believes from what he has seen, and from the experiments tried up to this time, that exotic kinds of Cotton can be grown in this district: the site he has selected on the Banar, he thinks particularly well suited: he sends a list of implements, &c., required for the proposed farm.

July.

In July Mr. Price's farm was sanctioned, and he was placed along with it under the supervision of the Commissioner of Dacca : the Agricultural Society was requested to revise his list of implements, and they were ordered.

Himself went up the Banar to inspect more in detail the districts of Capasia and Toke : these places are he thinks particularly adapted for his experimental farm, as he had already reported : any amount of land is available, and a variety of kinds of soil can be included within a moderately-sized farm : an opportunity will be thus afforded of judging what soil is best for which plant, and also for which season of sowing.

While Mr. Price is waiting for the official sanction to break ground in the fields which once grew what was then considered the finest Cotton in the world, by those who, as they made the finest cloth in the world, were presumably good judges, we may reflect that his position was radically different from that of the other American Cotton planters : the terms of his appointment showed that his first business was to investigate, he was to commence by small experiments : and having done this, having seen all the country round, explored it in each of the three seasons, having grown Cotton in small patches, and in many different places, he made his selection of a locality deliberately, and in the very words in which he announces it, accepts the responsibility and undertakes the duties of an investigator. The former experiment had, as we have seen, many critics, the objects proposed, the agency selected, and the plan of operations adopted, were in turn animadverted on by men who were in the best position to judge of their expediency, but it is difficult to see what was left undone in Mr. Price's case : the knowledge and experience of the members of the Agricultural Society was sought in aid, but no vexatious interference was by them, or indeed any one, felt or complained of by Mr. Price : he was allowed the greatest freedom of action, and had the hearty sympathy and the admirable advice of

CSL

Mr. Commissioner Dunbar, to help him at every stage of the proceeding; and, lastly, the extent of his operations was at his own discretion: he need not confine himself to the circumscribed area of a garden, nor were all his hopes directed to rendering his crops the largest possible, or even a profitable speculation.

August.

Mr. Price went to examine a patch of Cotton he had sown at Foolabaria, on the Delessury, which had been so much injured by the gale of the 22nd May: it had quite recovered, and was bearing bolls again: some Cotton planted by a villager at Karnopara was looking very well. On the 26th he again visited Foolabaria: he found his crop of New Orleans Cotton then ripening: the size of the boll is good, and the fibre firm and strong: some Bourbon seed sown in the same place had grown plants now 7 feet high: these were running to wood, and had not blossomed.

September.

He went to the Delessury: thence to see some lands in the Ram Bowal zemindaree, on the Banar: he had not yet seen this place: the ground was over-run with jungul, but the soil is the richest he has seen.

Again visited Foolabaria: the crop bears well; he cut down the Bourbon plants to 3 feet; they were nine months old, and had never borne a blossom: he had some hesitation in pruning, as he had never seen the system tried in the United States: it however succeeded

October.

The farming implements had not arrived, and his supply of seed was small: in consultation with Mr. Dunbar he determined to distribute what he had among the villagers, and work this year exclusively on the contract system; he accordingly spent the month in making arrangements with the landholders: and will defer cultivation until May or June next, "which is the season best suited to sowing the lands on the Banar River."

On the 11th he received some implements and seed from Mr. Terry of Rungpore: the latter of the Mexican and Bundelkhund kinds: the

CSL

Bundelkhund seed was spoiled : he asks for a large saw gin, and some "hand gins" : he also asked for an apprentice.

He forwards sundry parcels of Cotton, as samples of the last season's growth : and to enable a judgment to be formed as to the prospects of the experiment : with regard to the strength and color of these samples he says that allowance must be made for their having been picked in the native manner, that is, not taken off the bush as they ripened, but let lie there exposed to the weather ; save in this way, and this to a small extent, he believes the Cotton to be equal to American-grown New Orleans, and he hopes to convince the villagers of the folly of wasting their crop for want of a little care.

November.

Mr. Price visited Foolabaria early in the month, to sow more seed there : the land was not, however, ready : at Manickgunge he sowed some, and left orders for more to be sown : passing Foolabaria, he did the same there, and hoped his instructions would be followed : a few days after he heard that these fields were looking well, all the seed had germinated : he subsequently got some land into cultivation at Bickrampore.

He hoped to have 10 to 15 bigas planted at Sonargunge.

He also got Cotton sowed on the Luckye, and in two other places.

December.

At Sonargunge preparations are going on vigorously, at Bickrampore more than half the crop was sown. Some of the Rungpore Mexican seed sown near Naraingunge had only partially germinated : at Foolabaria he found that of all he had sown near there, on both banks of the Delessury, none of the New Orleans seed had germinated, and only a little of the Mexican.

At Manickgunge no better success was achieved : that this failure is not to be attributed either to soil or climate, is, he says, proved by the perfect success of the original crop at Foolabaria, where the seed sown had

CSL

been sound : it had borne Cotton during five consecutive months, and was at this time flowering once more, and forming healthy and numerous bolls.

Mr. Dunbar suggested, and Mr. Price agreed, that it would be well to have two farms, one in the northern part of the district, where the land is high, and sowing takes place in May and June ; the other in the south of it, where the ground is low, and the seed is put in as the annual inundation waters recede.

He regrets what must be acknowledged as the failure of the first regular attempt at extending the cultivation among the people : it was entirely due to the badness of the seed.

Operations in 1845.

January.

He went round to many of the other places where he had seed sown, and every where found the same sad failure: a small portion of the seed did here and there germinate, but even in such places the plants produced were sickly, and soon died out.

At the same time, some seed obtained from the first picking of the Foolabaria New Orleans crop, had germinated in a place where it was sown in the same field with some lately imported, and all of which failed : the crop, too, from this acclimated seed, although sown late, was growing vigorously and looking well, still further proving the cause of the failure.

February.

In company with Mr. Dunbar, Mr. Price again inspected many of the places recommended by him as suited to the experimental farm.

He finally decides on Suttipore, in Capasia, for the northern farm, and thinks 122 bigas of land enough.

CSL

March.

Early in March Mr. Price went to Foolabaria to negotiate the purchase of a supply of the seed of the Mymensing triennial Cotton plant*: he failed in obtaining it; he also tried to obtain some of the seed of the choice Dacca Cotton.

He then went up the Luckye to Suttipore, to mark out the boundaries of his farm; he found that he could not get as much land as he required, without including a good deal of jungul, and as his coolies had not yet arrived, and the season was getting late, he feared the clearing of this might interfere with his sowing time; he returned then to Toke, and abandoned Suttipore; he then had the ground surveyed, and he arranged for the construction of huts for his coolies.

April.

Mr. Price was engaged during the early part of this month in making arrangements for the reception of coolies on his farm, they did not however, arrive; he regrets this, and adds, " Not that I ever intended " planting in May, as, in my opinion, earlier than the 20th June would " be too soon, and I at present believe that the month of July will prove " the best month for planting; however, it is my intention, if I can " get laborers, to plant every month up to October, on the Toke farm."

He complains that the non-arrival of his promised dhangurs causes him serious delay in fencing and otherwise preparing his land.

May.

He received seed, native and exotic, and had it put up in earthen pots after being well dried in the sun, according to the native practice; the American seed looked sound, but half of the Bourbon kind was evidently rotten.

He proceeded to Toke, but did not succeed in obtaining labor until the end of the month; he had however begun preparing the ground, and asked

---

* It is elsewhere suggested that this is the produce of acclimatized Bourbon seed, some say introduced by the Portuguese.

CSL

for twenty head of good cattle, well able to plough, and for a horse for himself.

June. On the 1st he had 2 bigas of ground sown with American seed on the Toke farm; this germinated quickly, grew healthily, and by the end of the month stood eight inches high, some more sown on the 4th, 8th and 17th was all looking very well; rain was falling, which prevented him from weeding and moulding.

Some seed distributed among the villagers had also come up well.

Land was also being prepared for July sowings.

Mr. G. D. Glass had sent him three parcels of Cotton grown by him at Betal, from seed he had obtained from Mr. Price in December 1843; the plants have, he states, been yielding Cotton during the last ten months, and continue to do so.

July. The unusually great quantity of rain which fell at the end of last, and the beginning of this month, retarded preparations and sowings; only about 2 bigas of ground were prepared, and only a part of this sowed.

The Cotton sown last month had been seriously damaged by the continual rain, especially that last sown; some of this crop will have to be ploughed up and resown when the weather clears.

He has no cattle fit for his farm purposes, and has been recommended by those who know most of such things, to apply for a few oxen from Patna: he asks for twelve.

August, September, and October reports are not forthcoming.

November. There had been a great deal of sickness, especially in the early part of November, and his laborers at Toke had suffered much. He was occupied weeding and cleaning his crops, and in sowing all the ground he was able to get prepared.

"The early-planted Cotton seed on the farm, and in fact all planted "from the first of June up to the 30th September, is now scarcely growing "anything, although healthy enough in appearance."

He expresses a hope that all this crop may continue to grow as his Foolabaria Cotton has done: that crop had been slow at first, and seemed checked in its vegetation from December until March: after this it had grown vigorously, and in May was in full flower: it was again checked by a gale of wind in that month, but had completely recovered itself in September 1844 (about ten months after the seed had been sown): "since which time it "has continued bearing constantly, with the exception of two or three intervals of three weeks each." Mr. Price argues that if this kind of crop could be secured on the large scale, the profits of cultivating it must be as great as they are obvious, for that all expenses of cultivation are nearly got rid of during the three (perhaps more) years during which the plant stands.

December.

His laborers were employed in clearing and moulding the young crop, and in preparing ground and sowing seed. Growth has been checked by the cold of the nights, but the whole crop preserves a healthy appearance. The report of the village cultivation is not altogether satisfactory: out of eleven contract plantations, only three look really well: the seed, as a rule, germinated pretty well, but the young plants have in many places suffered from a small grey grub; in some fields where the seed had failed, he found, on examination, that it had really germinated, but that having been set too deep in the earth, the shoot had been unable to penetrate to the surface, and had rotted away.

His own plantation had suffered much from the depredations of wild hogs.

CSL

Operations in 1846.

January.

This month was spent like last in hoeing and weeding the standing crops, and in preparing ground.

February.

He visited the village cultivation : out of the whole only two fields had escaped the ravages of the insects already alluded to.

He asks for more seed to distribute to those whose first sowings had thus failed.

He found in the bazar at Naraingunge some Cotton brought in seed from Arracan, for sale there : " The bolls were large, and the wool might, with " care, be made an article marketable in England, although not quite so fine " in staple as American Cotton." He asks for seed from that district : and suggests that other good kinds of Indian seed should be sent him for trial.

He found the field of Bourbon Cotton at Foolabaria thriving and bearing well.

He supplied to Mr. J. P. Wise one and a half mans of fine native Cotton seed for transmission to the Rajah of Tipperah, also a bag of American seed.

Last year he had tried several kinds of manure, among others " indigo sittee" : this he found at least as good as any other : it is very plentiful in this district, and might, he thinks, be extensively utilized in this way.

April.

He applied for seeds of different kinds not yet tried, namely Sea Island, South American, and Mexican, also for a fresh supply of the Bourbon kind : he believes that the latter will certainly suit this country.

The weather continued dry up to the middle of the month : his laborers were employed in preparing ground for future sowing.

He visited some of the villages where he had Cotton fields, and founde them weeded and clean, and the people preparing more ground for th next sowing.

May.

He again went round the villages, and found the crops well-tended and flourishing; all the seed last sown was coming up and promised well. He had about 61 bigas of Patna Cotton seed sown in this way, besides which there were on the farm 18 bigas sown with Patna and fine Dacca seed, so that in all he had about 90 bigas of indigenous Cotton under culture.

Last year's pruned plants were now growing vigorously, and he hopes by pruning to elude the caterpillars, and also to prevent the plants from blossoming during the most rainy months.

He had forty-two plants produced from a crossed Cotton, which bore flowers plentifully, and were now covered with bolls: the wool was a very fine long staple, but had been injured both by rain and by an insect in the pods.

June.

Heavy rain fell during all the early part of the month.

Those of the Cotton villages which he had been able to visit were still very prosperous.

The farm Cotton, too, had not been hurt by the rain, and looked well; no caterpillar had as yet appeared, and his laborers were employed in weeding and moulding.

July.

The same prosperity continued.

August.

All continued well: no caterpillars had yet appeared.

He expressed himself in terms of great satisfaction as to the manner in which the villagers had treated his Cotton fields.

September.

He visited the villages on the Delessury, and found that great attention had been paid to the Cotton fields; on the Bramaputra, too, there were 5 bigas of particularly fine Patna Cotton growing. The Mymensing villagers came to him to ask his advice about their Patna Cotton crop; it had looked healthy up to this, but now the leaves were withering

CSL

and dropping off fast; on reaching his farm he found the 18 bigas of the same seed which he had sown there, in the same calamitous state: each of these cases of failure had occurred on stiff red clay soil, whereas the crops of the same kind of Cotton, standing on a light soil, still continued to prosper: the impression which has been produced by the success of this seed in the latter instance, is shown by the numbers of villagers who are now applying for advances for its cultivation.

The Patna seed had then failed on the farm: and from none of the exotic seeds had he ever reaped nearly half an average crop; he requests therefore leave to give up a portion of his land at Toke, and exchange it for some in the southern part of the district.

Mr. Dunbar, in compliance with this request, authorizes his removal to Bukhtabulli, about 10 miles below Dacca, where 50 or 60 bigas of good land will be placed at his disposal.

The farm thus restricted, Mr. Price will have leisure to direct his attention principally to the contract system, and push forward cultivation among the villagers.

October. The laborers have been weeding the fields and picking Cotton.

The Patna seed in the villages was turning out a very profitable crop.

November. For the first half of the month he was occupied in preparing and enclosing the land on the new farm, and in sowing about 25 bigas with American and Bourbon seed.

The few laborers remaining at Toke were picking the Cotton there. In the latter part of November he visited parts of the Tipperah Hills, near Commillah: he gives* a description of the cultivation as carried on there.

---

* The operations of the hill people who grow Cotton have been already several times described, and need not be here again noticed; they are very nearly identical all round the Bengal frontier.

CSL

December.

The exotic seed sown at the Dacca farm had come up well, and the plants were particularly fine. At Toke he found that the plants were suffering, as they had done last year; suspecting this might be due to the hardness of the stiff soil in which they grew, he had made a careful examination of some plants, and had, as he conjectured would be the case, found the roots completely earth-bound in a brick-like mass of clay.

He recommends that seed be liberally supplied to the Tipperah Rajah, but would not suggest any experimental cultivation in the hills.

Operations in 1848.

In January 1848 Mr. Dunbar addressed the Revenue Board on the subject of the experiment: he forwarded the following memorandum of the cost of the experiment up to that time:—

YEARS.	Mr. Price's Pay, &c.	The Farm.	Village cultivation.	Total.
1843 ...	Rs. 1,933 4 0	...	...	Rs. 1,933 4 0
1844 ...	„ 5,220 0 0	...	...	„ 5,220 0 0
1845 ...	„ 5,400 0 0	Rs. 1,630 2 0	Rs. 700	„ 7,730 2 0
1846 ...	„ 5,400 0 0	„ 1,992 12 0	„ 24	„ 7,416 12 0
1847 ...	„ 5,400 0 0	„ 1,910 13 8	„ 150	„ 7,460 13 8
Total ...	Rs. 23,353 4 0	Rs. 5,533 11 8	Rs. 874	Rs. 29,760 15 8

The total cost thus falls a little short of 30,000 Rupees; it is a large sum, but he does not think it has been uselessly spent.

GSL

The experiment has had many difficulties to contend against; much of the seed received from Calcutta was bad; caterpillars and worms attack the plant at various stages of growth; and in certain cases the soil had turned out ill-adapted to the crop. We have, at all events, learned that none of the exotic Cottons which have up to this time been tried, are, under the kind of treatment they have here met with, likely to succeed, but that under certain circumstances the Patna kind grows well Again, the success of the Bourbon and American seed tried at Foolabaria points to the fact, that under favorable circumstances these kinds will thrive.

Mr. Dunbar thinks the trial ought certainly not to be abandoned; Mr. Price at the new farm may follow up these hints, and be led perhaps to an unlooked-for success: being near to Dacca, Mr. Dunbar will be able personally to superintend his operations; he deprecates the idea of being understood to claim a knowledge superior to that of Mr. Price; he believes Mr. Price to be "a very hard-working man, and no doubt "a good practical planter, well fitted to superintend the Cotton cul- "tivation, if once fairly introduced and established; but it is my duty "to state, that I do not think him qualified to carry out, in its fullest "extent, the object which Government had in view when the present "experiment was first resolved on. The chances of success would "surely have been greater had the conduct of the experiment been "entrusted to a man of scientific acquirements. Mr. Price's experiments "do not appear to me to proceed upon any previously arranged system; "they are desultory and unconnected, and as far as I can judge from "his reports and conversation, not always regulated by the experience "which it is to be supposed he must be acquiring during their "progress."

January.

Mr. Price has been occupied in cultivating at the Dacca farm, and in removing everything from Toke.

February.

Similarly occupied; he also made arrangements for extending the village cultivation.

March.

His laborers have been ploughing and preparing for seed at the Dacca farm, also in weeding and moulding the crop sown there in November, which looks very healthy.

He had further extended his village cultivation, and reduced his farm establishment.

April.

A hot dry wind had prevented him from planting, although he has much of his land ready.

The villagers, also, who have taken advances, wait only for seed and rain, to commence sowing.

May.

Rain fell on the 11th May, after which Bourbon seed was sown; besides which more of the ground was prepared; and a hedge planted.

The villagers also sowed seed.

June.

The above seed all germinated and grew so rapidly as to require moulding and weeding early in June; it was necessary, too, to keep the earth well up about the young plants, as it was much washed away from them by the heavy rain, which continued falling.

The villagers' fields are also well covered with plants from the seed sown last month.

July.

The rain continued, and the young plants began to droop and lose their healthy aspect; but things soon got worse: on the 13th the flood rose so high that there was a foot of water over all the Cotton fields; by the 25th the water had subsided, but most of the plants were destroyed, and nearly the whole of the ground will have to be re-sown, when the arrival of fresh seed, and the state of the weather, permits. Some of the more forward of the plants have survived, and by the end of the month these once more looked healthy and well.

The village cultivation suffered as much as that on the farm, and most of the fields will have to be tilled anew.

Mr. Price visited much of the land in the neighborhood during the height of the flood, and found that the chur on which his farm stands is the highest of that kind of ground within reach; he was told that such a flood had not been known since 1833, but he had reason to believe that similar ones occur every four or five years, and although hurtful at the time, they must be ultimately of material benefit in consequence of their fertilizing effect on the soil; he has great hopes that his October sowings will reap the advantage of this one; and it suggests besides, that May and June sowings will not, as a rule, answer on chur lands, as the plant cannot be expected to have so early attained a size large enough to enable it to resist the inundation water.

August to October.

During the whole of the month of August the water lay so high that scarcely any cultivation could be effected, either on the farm or by the villagers.

Early in September a subsidence took place, and coolies were employed in weeding and moulding, making drains, and fetching manure; but by the 15th the water had once more risen, and work had to be stopped.

Mr. Price devoted September to visiting different parts of the neighborhood, and making advances for Cotton sowing in places where he thought the ground suited to the crop, and where the people were willing to undertake the cultivation.

Early in October sowing recommenced both on the farm and in the villages: former sowings were weeded and moulded: the seed now sown all germinated, and before the end of the month looked every where healthy and well.

GSL

His advances this year were all made on choice land ; and at this time there were 500 bigas all in a thoroughly prosperous condition.

November.

Early in November the sowing was over, and the crop was thoroughly weeded and moulded : it consisted of Bourbon, American, Patna, fine Dacca, and Tipperah hill Cotton; he also closed his operations in regard to advances. On inspecting the village cultivation he did not find it so well tended as he could wish.

December.

The weather was mild in the early part of the month, and the young plants kept growing vigorously, so that there was a prospect of their having strength to bear up against the cold nights when they came. He visited the villages and found the whole of the crops looking very well and healthy, save in one place, where a part of the Patna seed had failed to germinate.

From the first sowed field on the farm he picked within this month 10 mans of Cotton, although not more than one-fourth of the bolls opened.

Operations in 1849.

January.

The nights got colder, vegetation was checked, the plants ceased to yield, and the younger ones lost their healthy appearance : some rain which fell on the 19th was beneficial to these.

February to April.

The weather did not change in the early part of February, so that when Mr. Price went round the villages little change or improvement was apparent. Rain fell early in March, and the whole of the crops were greatly benefited by it. Some showers of hail, with high wind, damaged the plants in many places. On the 9th of April a severe hail-storm fell on the farm: it did no serious mischief there, but at Sonargunge and Kandee villages scarcely a plant escaped; he nevertheless hopes that with care and a little additional cultivation, the injured plants will come round again.

May to July.

Early in May he succeeded in inducing the villagers to make an effort for the recovery of the damaged crops, and was very successful in the attempt: the injury was for the most part repaired.

At Dhamghur he found some fields of Bourbon Cotton looking exceedingly well: at most of the villages indeed the crops looked well, and on the farm growth had been rapid, and all was prosperous.

Both during May and June a great deal of rain fell.

In July he visited Foolabaria, where he found all looking well: at Manickgunge most of the land sown had unhappily been swept away by the river: what remained of the crop looked very well.

Towards the end of the month the river rose again, and the farm was once more all under water; he hopes, however, that most of the crop is now sufficiently well grown to escape material injury.

August to October.

During August little could be done in cultivation, as the inundation continued, and there was incessant rain.

Early in September work was resumed, and Mr. Price went round his villages: the whole of this month and of October was spent in this way.

November & December.

The crops had scarcely recovered from the effects of the inundation when the cold nights began; the small quantity of Cotton, which had been picked at intervals, during part of November, ceased to be supplied by the plants, and all seemed withering and moribund.

Mr. Price was naturally in despair: "the fatality of the plant," he says, "seems to arise from a want of stamina, or strength to bring "its bolls to perfection, which appears to be occasioned by a constant "rotation of leafing, flowering, and bolling, which the plant undergoes, and

CSL

"which nothing but the richest soil could give support to and bring "to perfection: this evil I have tried to correct by depriving the "plant of part of its leaves, also by pruning, but to no purpose, which "fully convinces me that nothing but the very richest and finest lands "are suited to the cultivation of exotic Cotton in this country."

He asks to be removed to Mergui: he shortly after suggested Assam.

Dr. F. Royle remarks, "In reviewing the course of these experiments, "we find only a series of disasters. Notwithstanding, however, that "some of the difficulties may be fairly ascribed to over-luxuriance, we "find rich soils selected and manure thought essential."

We have already seen what Mr. Dunbar thought of the causes of failure.

Mr. J. P. Wise stated his belief that to whatever causes the failure might be due, it ought not to be attributed to the Dacca district being unsuited for the growth of exotic Cotton. And the question has lately been again asserted to be an open one.

The record of Mr. Price's misfortunes may, at all events, be taken as proving that something more than zealous perseverance and untiring energy is needed to command success where he so signally failed.

MR. PRICE IN ASSAM.

The subsequent career of Mr. Price is still more melancholy than his previous adventures at Dacca: indeed, he never attempted anything in Assam, where we next find him, which rose to the dignity of an experimental farm; he seems to have been from the first discouraged, and the authorities would appear to have seconded his efforts but coldly, or at least far less cordially than Mr. Dunbar had done at Dacca: up to this time the elements had fought against him, hail storms and inundations blighted his hopes, and overwhelmed him in gloom, or other natural phenomena interfered between him and the realization of his expectations in the form of unmanageable soils, or hosts of caterpillars : we now for the first time find him complaining of want of money, and of all the delays and disappointments consequent on difficulties of that fatal nature.

On the 15th May 1850 Major Jenkins recommends that Mr. Price should be settled in the Muttock district of Luckimpore : lands in that district now raise the best Cotton in the country, and the people are largely engaged in the cultivation : small experiments hitherto made there with exotic Cotton have moreover been attended with very successful results' as to the quality of the wool: and any extent of the finest land is available.

In March 1851 Mr. Price reported to Major Jenkins that, after a close inspection of much of the country, he has decided in favor of Dum-Duma as a site for his experimental farm, and requested money to commence clearing the ground.

In May he reported that the lands of Muttock were admirably suited for exotic Cotton, "being much superior to any that I had previously seen in India."

With regard to his outlay in the current season, he says that "it will "now naturally differ very much from what it otherwise would have been, "had I received funds in time to have commenced a cultivation during the "dry season in the Muttock district ; this not being the case, the dry "season being far advanced, I considered that I would be best serving "Government by advancing money myself to establish a small experi-"mental farm near Saikwah."

This he seems accordingly to have done : above 70 bigas of land was cleared, some buildings erected, and some seed sown.

His report on the quality of the soil, and a peculiar kind of indigenous Cotton, called *Dhera*, are noticed elsewhere.

Before making this commencement he had been most anxious to try the place at Dum-Duma first fixed on : but he could not go there for want of elephants, "which seemed to be always required for other purposes," and besides, he found it quite impossible to secure any laborers: the few by whose aid he had sown a little patch of ground with the *Dhera* and *Dhania* seeds of the country, near Saikwah, were driven to work for him only by temporary necessity, and would soon leave him.

The Commissioner enquired his reasons for preferring the place he had selected, rather than that recommended to him, in which latter he would certainly have escaped some, at least, of the difficulties he now complained of: Mr. Price replied that, after going about as much as his rheumatism and the want of an elephant permitted him to do, he was convinced that no locality could be better suited to his attempt than the one where he had broken ground: and that as to the difficulties, "there were no doubt many "to be contended with, all which, however, might be overcome, except "the worst of all difficulties in agriculture, the want of funds."

He had not, up to June, sown any exotic seed: some received from Calcutta had lost its germinating power before it reached him: he fears this is also the case with some which he had brought up himself, but he intended trying this latter shortly.

In October some heavy rain proved most injurious to his crop (native kinds only): nearly all the flowers were beaten off, and the buds destroyed: some of that later planted was less damaged: the village cultivation in the neighborhood suffered to such an extent that the people say they cannot hope to pick one-fifth of the ordinary crop.

At the end of this month, and in November, some supplies of exotic seed were received: all that above alluded to proved, as he had anticipated, bad. That which now arrived was too late in the season to admit of any reasonable hope of its being successful: he, nevertheless, sowed a part of it: most of these sowings germinated, but the cold nights killed nearly the whole: he is "afraid we are too near the snowy hills for that "kind to succeed well, at least with late planting. I am therefore led to "believe that Central or Lower Assam would suit the cultivation of exotic

"Cotton better than this part of the province." He does not mention to what kind of exotic Cotton the above remark is supposed to apply.

In April 1852 Mr. Price reports that the plants from the above seed had grown, and were bearing, and that a crop might be hoped from them next year, but none this season.

He had been, he said, anxious to clean some of the best Assam Cotton in a proper manner, to test its fitness for the English market, but had been unable to commence operations from want of money.

In May he writes from Tezpore, to which place he had moved from Saikwah. He asks for 150 Rupees to enable him to sow some exotic and *Dhera* Cotton seed: the sowing time was coming on, and he was anxious to have the seed in the ground before the middle of July.

The letter here referred to is the last document which I have found, in which any of Mr. Price's proceedings in Assam are noticed. At Dacca success seemed to be within his reach: in Assam it seems to have been from the first simply impossible.

All his experimental cultivation proved a total failure: of the exotic kinds not even a sample was ever preserved, and the crops of the native Cotton are stated not to have paid for their picking: to test the value of the best Cotton of the country, Mr. Price was, however, before he left Assam, authorized to purchase a quantity in the market, which he cleaned under his own superintendence, and packed: twenty-five bales of this Cotton reached Calcutta, and would have been forwarded to England, but that the Calcutta brokers, to whose opinion it was submitted, pronounced it utterly bad; it was accordingly thought useless to send it to Liverpool, and when sold in Calcutta, it fetched little more than the minimum price of common Bengal Cotton. The bales seem to have weighed only a man (80 lbs.) each: they were the clean Cotton obtained from 84 mans of seed Cotton, which Mr. Price purchased in Assam for Rupees 231. The cost of cleaning, together with the carriage of the cleaned Cotton to Gowhatti, cost Rupees 249-12, so that the 25 mans had at Gowhatti cost in

CSL

all, Rupees 480-12, that is nearly Rupees 19 per man : if a Rupee per man be charged for freight from Gowhatti to Calcutta (they were brought down in a Government steamer, so that this charge did not appear in the account), the total cost in Calcutta will be Rupees 505-12, namely, Rupees 20-2 per man (more than 6*d.* per lb).

But the Cotton sold in Calcutta at Rupees 10 per man, little more than half what it had cost at Gowhatti.

Mr. Price's failure was then as complete when he tried the trade, as it had been when he confined himself to the culture of Cotton.

Although in its conclusion this experiment resembles that of the four planters, it was at every previous stage quite dissimilar: first, the object with which it was instituted was quite distinct: and the steps taken to attain the object proposed were, in each case, very different. Mr. Price's business was to investigate, to determine, as stated by Mr. Dunbar, what seed was fitted to what soil, or if any were, as had been over and over again stated : his labors, as considered from this point of view, did not establish any fact of material interest or usefulness, nor were they likely to have done so : we may safely take Mr. Dunbar's estimate of their value in this respect, an estimate which is certainly confirmed by a perusal of Mr. Price's detailed reports. There was one ground which Mr. Price occupied in common with the four planters however : it was stated to have been expected of them, as well as of him, to instruct the villagers in better methods of cultivation, and to introduce among them seed of better varieties : as to the result of the two great experiments in this important matter little information exists. I have not indeed met with any statement suggesting the supposition that the former one left the slightest trace of any kind on the agriculture of Bundelkhund, the Doab, or Goruckpore.

But in a report on the Cotton crop of Dacca, forwarded to Government in 1857, it is stated that the Patna seed introduced into that district by Mr. Price, is still a favorite and a remunerative crop, relatively at least to other varities of Cotton sown, and this at least may be claimed as a success as far as it goes.

In 1854 Mr. Price visited Pegu; some of his reports on parts of British Birmah have been quoted in our descriptive notice of the Cotton-growing capabilities of the province, but no experiment was tried there, and he did not, as far as is recorded, remain long in the country.

Mr. H. Hamilton Bell's Experiment.

In May 1846, Mr. Thomason, Lieutenant-Governor of the North-West Provinces, recorded a minute on the subject of the experiments lately made in the provinces.

During the last two years of his engagement, Mr. Finnie's attention had (as we have seen) been principally directed to ginning and preparing for the English market Cotton cultivated under contract by the villagers of the Agra district, or purchased in the market there: a batch of this Cotton, sent home in 1844-45, had been unfavorably received in the market, and the farther supply forwarded in 1845-46, when examined in Calcutta, was found to be so poor, that no better fate could be expected for it.

Since then Mr. Finnie, as well as Mr. Frost, the mechanic sent out by the Court to manage the machinery, had left that part of the country; but a large quantity of costly gins, screws, and other machinery was left idle in the possession of Government.

The cultivation of exotic Cotton, by those who best understood the subject, had failed.

The common Cotton of the country, cleaned and prepared by men accustomed to the work, and skilled in all its practical details, had proved unfit for the English market.

Moreover, all attempts at so cultivating the indigenous Cotton, as to adapt it to the requirements of English spinners, had also failed.

The Cotton of the province was in the worst repute in Europe, and even in China: and at the same time, the importance of the crop to India, and the political aspect of affairs in America, were now as powerful incentives as they had ever been to exertion in regard to the possibility of making India the source of supply for Manchester.

Mr. H. H. Bell, a gentleman of wealth and standing, long a resident near Agra, owner of estates in the district, possessed of great local influence among the people, and with the advantage of extensive knowledge, and long experience in the agriculture of that part of India, made the following proposal, which the Lieutenant-Governor, in the minute quoted, submits to the Governor-General, having already accepted it on his own responsibility.

Mr. Bell had, after long research, and many experiments, succeeded in discovering a variety of native Cotton, whose natural qualities fit it completely for the English market: he had grown a crop of this Cotton, and had sent some of the produce to Liverpool: it sold as follows:—

9 bales (pretty clean, but rather seedy, fair color, staple fair length)	4⅛*d.* per lb.
6 bales (pretty free from leaf, part very seedy, fair color, staple uneven, injured in ginning)	4*d.* ,,
2 bales (leafy, seedy, rather brown in color, staple much cut in the gin)	3¾*d.* ,,

The corresponding prices in the price current of the day of sale were as follows:—

Surat	2¼*d.* to 3⅝*d.*
Bowed Georgia	3½*d.* to 4¼*d.*
New Orleans	3¾*d.* to 5½*d.*

Here then was Cotton grown near Agra, which had sold in England at American prices: it was the produce of an Indian variety, which had always been cultivated by the natives in their own way, and could be so cultivated to any desired extent.

Mr. Bell was willing to undertake the management of an experiment on a large scale, and on these terms: Government was to advance all the money required, keeping a check on all disbursements in any way thought most efficient; Mr. Bell was on his part to do the work, receiving no remuneration whatever, but was to reap the ultimate advantage derived as profit from the operation at the close of the year. Seed would have to be brought from a distance, advances arranged with cultivators, these purchases and advances should be paid by, and receive the sanction of, Government, but their details would be managed entirely by Mr. Bell himself.

This offer was accepted by Mr. Thomason.

The contracts with cultivators were to be like those made for Indigo, binding them under a penalty to cultivate a certain number of bigas in a specified manner, and to deliver the produce at a fixed rate: an advance to be given on execution of the contract, and balance to be adjusted on delivery of the Cotton.

A great part of the produce would be cleaned by the common churka, some by the Government gins, and the whole shipped at the cost and risk of Government, a lien being carefully secured on the Cotton at all stages of its progress.

The account was to be made up without interest, and, as stated, Mr. Bell to have the profits.

To Mr. C. Allen was entrusted the care of disbursing the money, and otherwise aiding Mr. Bell, and at the same time of watching over the interests of Government: 10,000 bigas were to be cultivated: the estimated outlay was set down at Rupees 1,32,000, and the following statement of it is given by Mr. Allen:—

For 8,500 Agra mans (10,625 bazar mans) or 850,000 lbs. of Cotton under contract	Rs.	76,500
Establishment	„	1,254
Carting, weighing, packing, and screwing	„	4,998
Carriage to Calcutta (with insurance, Rupees 1,000) ...	„	8,036
Charges at Calcutta	„	9,908
Charges at Liverpool, freight, brokerage, &c. ...	„	32,830
Total cost in Liverpool,	Rs.	1,33,526

CSL

850,000 lbs., at 4*d.* per lb.	Rs. 1,41,666	
Ditto, „ 4⅛*d.* „	„ 1,46,093	
Consequently, profit at 4*d.* per lb.		Rs. 8,140
Ditto, „ 4⅛*d.* „		„ 12,567

According to these figures the estimated profit on the operation was to have been at 4*d.* a little over 6, and at 4½*d.* a little over 9 per cent.

The above figures are taken from Mr. Allen's estimate* as to the detailed items of the account: in adding up however and in calculating the profit Mr. Allen's figures stand thus :—

Total cost in Liverpool		Rs. 1,32,272
8,500 local mans (100 tolas to the seer) are equivalent to 10,625 Calcutta bazar mans, equal to 931,428 lbs., which, at 4*d.* per lb., gives	£15,523-16	
(Taking the exchange at 2*s.* a Rupee)		Rs. 1,55,238
Profit		Rs. 22,966
If Cotton sell for 4⅛*d.*, we add		„ 4,729
Making profit ...		Rs. 27,695

The discrepancy in the total cost rises probably from a clerical error in the addition; but the serious difference in the estimated profits is not apparently accidental.

Eight thousand five hundred mans, at 100 tolahs to the seer, are equal to 850,000 lbs., not to 931,428 lbs.; 10,625 Calcutta bazar mans being also 850,000 lbs.

The reason which Mr. Allen had for estimating the profits on so large a number of lbs. is, no doubt, capable of being explained, but since the whole statement, *as it stands*, seemed to lead to misconception, it was thought better to reproduce it here, alongside of what, as far as the weights, prices, and their equivalents go, seems to be the real state of the case. If the Cotton sold for 4*d.*, the figures show that the total profit would have been, according to the estimate, only Rupees 8,140, whereas Mr. Allen states that at that price it would have been Rupees 22,966, and at 4⅛*d.*, Rupees 27,695. I have failed to discover the explanation of this extraordinary discrepancy, so am forced to leave it unexplained.

---

* Figures taken from Parliamentary Blue-book.

When the arrangements were finally completed for entering on the experiment, it was found too late in the season to procure a sufficient quantity of seed of the desired kinds to admit of contracts being made for so large a quantity as was at first contemplated; thus it became, when the time came, necessary to obtain authority for purchasing some supplementary supplies: in order to do this to the best effect, it was determined that the purchased Cotton should not be that ordinarily obtainable in the Agra bazar, but of certain choice kinds known to be grown in many parts of Rajputana. All of these were kept separate, bales of each kind branded distinctively, so that the values set on them at home might hereafter suggest if any one were specially deserving of being cultivated. When the whole of the Cotton was collected it ranked thus:—

Grown on contract for Mr. Bell	619	Mans.
Purchased at Tonk	2,035	"
" Bagcheni	1,135	"
" Chatsoo	865	"
" Chowria Newae...	816	"
" Other marts in Rajputana	1,041	"
	6,511	Mans.

which cost at Agra Rupees 52,875.

After this had been picked and re-cleaned, the weight was reduced to 5,932 mans: and the sale of refuse and seed brought the cost down

CSL

to Rupees 46,828. Five thousand nine hundred and thirty-two mans in 1,625 bales.

Cost at Agra	Rs.	46,828	0	0
Sundry charges on collecting at Agra	„	529	1	6
Picking, &c.	„	4,202	9	6
Superintendence	„	892	7	0
Bowing (experiment tried on some of the Cotton)	„	201	6	0
Stowage, weighing, &c.	„	1,460	13	3
Screwing bales	„	3,250	0	0
Freight to Calcutta	„	4,218	2	0
Insurance	„	3,279	11	0
Total,	Rs.	64,862	2	3*

In reporting on the proceedings so far, Mr. Allen observes that the Cotton was bought privately, and in the ordinary way of business, without any interference whatever on the part of Government.

More Cotton being in several cases brought in from the several marts than was ordered on the part of Government, Mr. Bell at once took over the surplus to his own private account, and without opening or re-packing, sent it on at once to Mirzapore for sale. He realized a profit of Rupees 4,000 on this Cotton.

The first cost of all the Rajputana Cotton was greatly enhanced, by having to be brought on an average 150 miles to Agra, besides which the transit duties levied by the several Native States through which it had to pass, amounted to no less than 29½ per cent. on the first cost, and if the Company's dues had been also levied, this tax would have equalled 40 per cent.

---

*In his letter of 22nd September 1847, Mr. Allen states this sum as Rupees 64,661-10-8. The letter of the Governor-General to Court, 18th March 1848, states it as Rupees 67,916-10-11; and Mr. C. Grant, Accountant N. W. P., in February 1848, says it was Rupees 69,916-10-11, all which apparently discrepant statements are no doubt easily reconcileable by supposing some charge included in one to be excluded from another, but I have failed to discover what sums have been so treated.

CSL

Great difficulty was experienced from the want of proper screws, all those at Agra being found quite incompetent to perform the process, small bales had to be made up (200 lbs. to the bale). The gins also were found to injure the Cotton so much that they were abandoned, and the native churka used instead: seventeen bales of ginned Cotton were kept separate, fifty bales of Cotton that had been bowed, are also specially branded. Mr. Allen constructed a table, showing the following particulars for 3,717 mans (and 35 seers) of the Rajputana Cotton (304,866 lbs.).

	Cost.	Per Man.	Per lb.
		Rs. A. P.	*d.*
First cost	17,509 11 6	4 11 4	1·378
Foreign transit dues	5,183 2 4	1 6 4	·408
Carriage to Agra	2,998 14 4	0 12 11	·236
Bags, Commission, &c.	2,431 1 10	0 10 6	·192
Total (and average) cost at Agra...	28,182 14 0	7 9 1	2·214
Cleaning and picking at Agra (reduced the weight to 282,600 lbs., on which averages are calculated henceforth) ...	2,304 2 4	0 9 11	·188
Screwing at Agra	1,836 0 4	0 8 6	·156
Freight to Calcutta	2,513 11 4	0 11 8	·213
Insurance	1,852 13 0	0 8 7	·157
Miscellaneous Charges at Agra ...	1,329 6 6	0 6 2	·113
Re-screwing at Calcutta	1,485 7 0	0 6 10	·126
Commission, &c.	1,467 9 6	0 6 9	·124
Freight to Liverpool	9,420 0 0	2 11 8	·8
Insurance	1,042 6 3	0 4 10	·088
Total	51,375 6 1		
Drawback for refuse sold	2,328 2 11		
Nett cost at Liverpool, 942 bales, 282,600 lbs.	49,047 3 2	14 3 9	4·166

It is remarkable that, notwithstanding the 29½ per cent. added to the cost by transit dues and in spite of the charges necessarily incurred by this Cotton having to travel 150 miles, it was nevertheless laid down at Agra cheaper than Cotton could there be grown: its first cost shows that it is produced for five-eighths of that of the Doab Cotton.

With regard to the cleaning of the Cotton, Mr. Allen remarks that most of the Rajputana Cotton was separated from the seed where it grew, and had only to be picked as free as possible of extraneous impurities, which was done at great cost and trouble at Agra; that portion of the total supply which was delivered in seed had, for the most part, to be cleaned by the churka; now even should this necessity recur next year, a very material diminution in this part of the expenses will be effected, for by some simple arrangements, and by the expertness which, under judicious management, the laborers employed in this work developed, the Cotton was, towards the end of the season, cleaned very much more cheaply, as well as better, and more expeditiously, than at the beginning. Besides which, Mr. Allen hopes that, although the saw gins, as they stand, cannot be used for the Indian Cotton, yet that some means may be discovered of adapting their action to the peculiarities of the material: or else some other machine invented to do the work efficiently, and at as little cost. Altogether he anticipates that the expense of cleaning need never again bear so large a proportion to the aggregate cost of production.

The double charge for packing and screwing seemed to Mr. Allen to be also avoidable hereafter; for the present it was absolutely necessary: the presses at Agra could not be made to do more than they had done, and until much more efficient screws were set up, the Cotton must undergo a second packing before shipment.

The charge for insurance he also considered excessive: it was 80 per cent. more from Agra to Calcutta than from that port to Liverpool. He believes that if a transport trade in Cotton arises, the natives will very soon begin to underwrite at very much more moderate rates.

The freight to Calcutta was not high, but he thought £5 per ton far above the average from Calcutta to Liverpool.

Finally, Mr. Allen saw reason to anticipate that a very considerable reduction would hereafter be effected in a variety of ways on the cost of the Agra Cotton, as laid down in Liverpool.

CSL

The Cotton arrived in Calcutta in 1,625 bales, of about 300 lbs., and having, as above stated, cost Rupees 64,862-2-3. It was re-screwed and packed, and left Calcutta (in October 1847) in 1,660½ 300-lb. bales, the excess of weight being due to inaccuracy in the original weighments, and to absorbed moisture, : it had in Calcutta cost for commission, &c., Rupees 5,436-11-6.

Total at Calcutta being Rupees 70,298-13-9.

The cost is, however, thus stated in a letter from the Governor-General to the Court which announces the final despatch of the Cotton.

Total expense in India (2 shillings per Rupee) ...	£6,791	13	4
Freight and insurance	£1,844	5	0
Total cost at Liverpool	£8,635	18	4

Or about 4⅛*d.* per lb.

The discrepancies above alluded to may be treated as due to small errors somewhere accidentally introduced, and this statement accepted : and although it does not agree with others also authoritatively made, yet the differences are not perceptible when reduced to the price of the Cotton per lb.

We have seen Mr. Bell's estimate, and we have here the result of his first effort to realize it : in round numbers his promise was to lay down Cotton at Liverpool profitably at 4*d.* per lb., his Cotton really cost 4⅛*d.* We have also seen from Mr. Allen's reports how much there was exceptional in this first season's expenses : taking these things into consideration, it must be confessed that the trial can scarcely be called a failure : compared with the fate of all previous experiments, it must rank as a brilliant success.

There remains, however, to apply to this Cotton the one test which can alone give us the true measure of the success of the operation. We

CSL

have seen that Mr. Bell's calculations were based on the price for which he had actually sold some bales of Cotton of the same kind as this now sent: they had fetched the price of middling Upland American Cotton. When, however, this Cotton reached England, it was valued at 3½*d.* to 3⅝*d.* per lb.: some delay occurred in effecting the sale, and it ultimately was sold at an average of 3*d.* all round, at a time when New Orleans was selling for 3¼*d.* to 3¾*d.*; it did not then come up to the standard assumed as the basis of calculation, and must be considered a failure from this cause only. There was, it is true, a positive loss of 1⅛*d.* per lb., but this need not have affected the general question of the result, considered as an experiment, for Dr. Royle tells us that (taking proportionate values as an index), this Cotton would, had it been sold three or four months earlier, have brought 6*d.* per lb., or a few months later, 5*d.* As an index, too, to the character which it took up in the market, Dr. Royle farther mentions, that of the whole quantity only 186 bales were sold for re-exportation to Europe, and this at a time when there was plenty of cheap American Cotton available.

Mr. Bell addressed the Lieutenant-Governor on the subject of the experiment, in April 1848; he assumed that the price at which the Cotton actually sold was no fair criterion, and claimed that, financially considered, there was cause for regret, but not for despair. He also pointed out that the trial had proved that his Bagcheni Cotton, grown on a large scale in the Doab, about Agra, was quite equal to the produce of the best of the Bundelkhund and Rajputana localities; he thus shows that he had proceeded originally on grounds which had been justified by the event, save only in the price of such Cotton at home; this mistake was unaccountable; the samples of this year had been pronounced equal to those of his original produce; his original investment had consisted not of samples but of marketable bales, which had been sold like other Cotton, and (as has been stated) had fetched the price of ordinary to middling New Orleans; they had been spoken of, too, as only pretty clean, a particular in which the last year's investment was certainly superior to them: in spite of all

GSL

which, there was the result : it justified him, and his proposal was warranted by all the facts of this case ; but it must nevertheless be accepted as final : he now knew that in future he could land Cotton in England, such as he had this year sent, considerably cheaper than he had been able to do in the case of his first attempt ; but the object was to send a Cotton which the spinners would use on an equality with the ordinary run of American Upland ; in this he had failed : Mr. Turner called the Cotton *rubbish*, and he and others said that it was not fit for their mills ; that was, as far as the object proposed went, decisive, and Mr. Bell now suggested that the experiment should be abandoned as quickly as was consistent with due consideration to recovering the advances already made, and saving all that could be saved of the money already laid out.

In pursuance of this plan a small investment of similar Cotton was, in 1848, made : 102 bales were shipped from Calcutta in September ; 29,906 lbs. of this Cotton cost in Liverpool £547-16-10, that is about 4⅜*d.* per lb., and it sold for 3½*d.* per lb.

Mr. Allen reviewed the whole course of the experiment in March 1851.

The nett loss at the exchange of the day was £72-0-11, or at 2*s.* per Rupee, £111-12-0, which, on the gross outlay of £547-16-10, is about 20 per cent. The percentage of the loss on the former year's operations was rather less, "the present prices of Cotton in England are fully " 80 per cent. higher than they were at the time these sales were made, " so that similar shipments in 1850 would have realized a gain of 44 per " cent. instead of a loss of 20."

The first positive result is, that Cotton has been sent from Agra, so as to cost 4⅜*d.* to 4½*d.* per lb. in Liverpool, which, in an unusually depressed state of the trade, was bought for 3½*d.*, and spun in England, in spite of all that was said about its being unfit for the looms there.

He is certain, that as to almost every item in the cost of production, material reduction could be effected : this may be taken as a maximum, whereas the selling price is very nearly a minimum.

The solitary defect of this Cotton was said to be shortness of staple: every one acknowledged that in color, strength, cleanness, &c., it was all that could be required.

And Mr. Allen concludes by remarking that in this particular, although a sudden change could not be effected, a gradual one might be reasonably expected, if a trade sprung up: and that India having done thus much, it remains for the spinners to adapt their machinery to a material whose excellence is acknowledged, or else, by not doing so, to remain in the often lamented position of absolute dependence on America.

The close of this experiment was sad: Mr. Bell, to whose intelligence, zeal, and liberality Mr. Thomason and Mr. Allen seem to take a pleasure in bearing testimony, took on himself the risk and responsibilty of all outstanding sums advanced to cultivators, so as to free Government from the loss as far as he could; at first these sums amounted in the aggregate to Rupees 37,552, part of which Mr. Bell subsequently paid into the treasury, to his own loss; at the time of his death, which unhappily occurred not long after, there was still a sum of Rupees 24,589 unpaid. This represents the cost to the public of the last great experiment made with a view to render India a source of Cotton supply.

We have already seen that each of these experiments proceeded on its own system; the considerations which suggested each were distinct, the object proposed unlike, and the means employed dissimilar.

A detailed history of them might be made instructive and even amusing in many ways: for there was in the course they each ran, a certain dramatic unity, which would readily lend itself to such treatment; but those facts alone which bear directly on the question at issue, have been admitted into the condensed narrative contained in these pages, and I can only hope that a perusal of them will be found to attain the object constantly kept in view, namely, to suggest reflections of some practical utility to the intending Cotton trader in India.

CSL

MACHINERY.

During all this time, both Government and private individuals interested in the question of Indian Cotton production, had kept in view the importance of the process of cleaning; and from the earliest times of which I have seen any notices, attention has been constantly directed to the improvement of this branch of the trade.

In 1829 the Court of Directors stated that they had at several times sent different machines to India, with the hope of bettering the condition in which their Cotton reached England: and lastly two, of "a new instrument called Whitney's saw gin," which it was stated had given so great an impulse to the production of Cotton in America. Other American saw gins had formerly been sent to India, and on one occasion, under the charge of an American mechanic: two gins had also been made by Mr. Maudsley for the Company, but all had alike failed.

In 1830, when a Mr. Cobet of the Hague addressed the Secretary on the subject of a machine lately invented by him for cleaning Cotton, it was determined to await the report of the trial then being made in India of the newly improved American saw gins by Whitney, which had been sent out the previous year.

Two of these gins were at Etawah in 1831, and the Resident complained that, despite all his efforts to do so, he had failed in setting them up in working order, in time to try them on that year's crop. In 1832 he had, however, got them into gear, and he reports on the result of his trials.

To work the gin for a day took eight men to drive the wheel, and one to feed the receptacle with raw Cotton.

Setting other nine men to work with ordinary churkas, he found that they turned out more clean Cotton than the gin.

Besides which, the ginned Cotton was not so well separated from the seed.

CSL

The waste was also greater: for the proportion of seed, &c., left by the gin, was 66 per cent. on the raw produce; whereas the churka left only $61\frac{2}{3}$ per cent., or even $61\frac{1}{3}$ per cent.

The absolute cost (excluding the set off for seed and refuse) of ginning one man of Cotton (that is, turning out one man of clean Cotton), was found to be, for labor, Rupees 1-10-$7\frac{1}{2}$, or even as much as Rupees 1-11-$4\frac{3}{4}$ more than for cleaning it by churka.

The ginned Cotton has a cleaner look, but the Mirzapore merchants, who were then making their investments in Bundelkhund, had declined to give a higher price for it: and the Resident does not know if in some other market it could command a better price.

He had some ginned Cotton spun, but the spinners did not like it, and the weavers showed a preference for the churka cleaned Cotton.

He is under the general impression, without being quite sure, that the gin has some detrimental action on the staple.

Writing in 1839, the Court of Directors state that the American machinery which, up to that time, had been sent out to India, had not succeeded, and they mention a new instrument lately brought to their notice by the East Indian Association of Glasgow.

Lord Auckland in reply says that all instruments containing saws had hitherto been found to injure most seriously all Indian Cotton, however successful they may have been in America, and he hopes great things of the roller gin now promised.

Captain Bayles brought with him, as we have seen, some American gins, but as regards the working of these, as indeed as regards all details of this experiment, we hear absolutely nothing which could offer suggestions or give information as to the future. Captain Bayles and the Americans kept their grand but distant object in view, and overlooked such minor considerations as whether their gins did or did not destroy the fibre of Indian Cotton.

CSL

There are records of Cotton experimentally cultivated at Allahabad, which were ginned by Mr. Finnie, and which the Agricultural Society's Cotton Committee said were much injured in the process ; and when Mr. Finnie subsequently began to gin Cotton at Agra for exportation, it was found that the staple was also much damaged in the cleaning, and that this continued to be the case even under the more skilful management of Mr. Frost.

When Mr. Bell commenced work, it was soon found that a direct interest in the pecuniary result at once pointed out the inefficiency of the machinery ; the gins were used for only a small part of the Cotton, and Mr. Mather was employed to improve on the then last improvement, which was Potter's churka : neither this nor the cottage gin, subsequently sent for trial, were thought by Mr. Bell superior to the ordinary churka, although each had special disadvantages of its own.

Three year's experience in connection with Cotton machinery in Madras had convinced Mr. Mather of the radical defects of the then used American gin, and apparently of the general principle of saw gins, as not capable of adaption to Indian Cotton. He was employed in January 1848 by the Government of the North-West Provinces to bring his knowledge to bear on the improvement of machinery in use there.

He shortly after exhibited a working model of an improved churka. This was submitted to a Committee, which recommended that Mr. Mather should be sent to Calcutta to construct twelve such instruments as the model represented, with certain sugguested alterations for trial.

Mr. Simms watched and reported on the progress of this undertaking ; the churkas were made ; they were in Calcutta inspected by, and worked in presence of, a Committee of officers appointed for the purpose, and subsequently by Lord Dalhousie, and were approved of ; eleven of them were sent to Agra for trial in July 1849.

Meanwhile the Agricultural Society had not been idle. In 1846 Mr. C. B. Taylor published in their journal drawings and descriptions of an instrument invented by him: he speaks of his work as a compilation from published notices on the subject, and of the machine as a re-arrangement of others previously existing.

In this same year Major Jenkins, of Assam, notices the fact that for Indian Cotton the American gin will not answer: its seed is too small for the saw arrangement to be applicable to it, and it adheres so tenaciously to the fibre, that the violence necessary to separate them always hopelessly damages the latter. The churka is a really efficient instrument as far as it goes, and if carefully constructed and properly worked, does justice to the fibre: but then it is so very slow, that as long as it remains the only mode of preparing Cotton for the market, a large export trade is practically impossible.

Major Jenkins subsequently placed a sum of Rupees 500 at the disposal of the Agricultural Society, which they offered as a prize for an improved Cotton-cleaning instrument on the churka principle.

Mr. Bell also communicated with the Society on the subject of the churka: it was, he said, capable of great improvement: the Agra churka was superior to many in use elsewhere, but that employed at Broach could do the work of six Agra churkas, and Dr. Burn of that place stated to him that his brother had introduced some material improvements into this even.

In March 1846 Mr. R. Burn himself addressed the Society on the subject: he had constructed an improved churka, which he wished should compete for Major Jenkins' prize, and the Society's medal: it had been submitted to the Bombay Government for inspection, but he had heard nothing of it for a long time, and was unable to get it back. He requested the Society to apply for it.

In April 1847 Mr. J. Petrie, who was then connected with the management of the machinery at the Coimbatore Government farms, writes to the Society on the subject. He thinks it is a mistake to imagine that the principle of the saw gin is defective: this impression was originally produced by the injury always done to Indian Cotton by the American gins, and it has led the Society to limit their prize to instruments made on the churka principle : he has, however, he says, constructed a saw gin, then working on the farm, which turns out the Cotton as perfectly uninjured as any churka could, and at the same time in a quantity which it is physically impossible that any churka could equal. Dr. Wight, the superintendent of the establishment, testifies in the strongest terms to the efficiency of the gin; it does not injure the staple, and it works as rapidly as an American gin would : "viewed in "respect to the speedy, economical, and perfect manner in which it "cleans the native Cotton, this machine is the best extant."

The conditions had been long published, and the Society could not admit Mr. Petrie's gin to compete. The competition took place in September 1848. There were four candidates, Potter's, Burn's, Mather's, and a common native churka. The first trial excluded the two former, and a subsequent trial resulted thus :—

Cost of working native churka, being taken as unity,

Native churka, cost	1,	out-turn	1
Mather's	3	„	2,864

The times being the same in each case.

The prize was adjudged to Mr. Mather, 500 Rupees, and the Society's Medal.

Mr. Mornay objected to the award : cheapness was one of the essential conditions, for the declared object was to obtain an instrument that should be available in the Indian village : and by its low price and efficiency, enable the grower to dispose of his produce to greater advantage than was now possible. Mather's churka nominally cost 60 Rupees, but

CSL

could not however be sold for that price, which was itself as completely prohibitory as regards the Indian village as if it had cost a lakh of Rupees. Besides which it did not do more duty in proportion to the labor employed than the native churka, but rather less, while the latter cost only one Rupee.

Mr. Mather moreover was present to work his own churka, and it was suggested, that had Mr. Burn's or Mr. Potter's had a similar advantage, the result might have been different.

Mr. Mather, however, won the palm.

In July 1849 eleven of Mr. Mather's churkas, improved on the prize one, and constructed at the expense of Government, were set to work at Agra.

At the time when Mr. Mather had originally exhibited his working model at Agra, in 1848, it was stated to be an improvement on a Potter's churka then at Agra, and which had been previously tried along with the ordinary native churka, and not found to give any better results either in quantity or quality. Mr. Potter had, however, deprecated a trial of this kind; he said that no correct estimate could be formed of the capabilities of the machine he had invented, until twelve of them were set to work together, and kept in uniform motion by a pair of oxen: and it was to afford this trial that eleven similiar (supposed improved) machines had been ordered from Mr. Mather.

They were set up, worked by a uniform motive power, and carefully watched through several days' trials, by a Committee appointed for the purpose. Mr. Bell and Captain Oldfield were members: some native churkas were set to work beside them, moved by the same power, and fed in the same way.

The native churka was pronounced to be in every essential decidedly superior.

Captain Oldfield went carefully into the details of the experiment: repeated trials proved to him that the native churka actually gave twice the out-turn of Mr. Mather's, he indicates several defects in the construction of the latter, both in conception and execution, and finally points out that its price utterly unfits it for realizing the object proposed for attainment. The Committee pronounced it a complete failure.

Mr. Mather however justified the instrument to Government, satisfied the authorities in Calcutta that justice had not been done to it at Agra, and at the strong recommendation of Mr. Simms, was ordered to proceed with his work and to construct ninety-six such churkas, being eight sets of twelve each.

In September 1848, after the first set had been completed, the account of the cost was submitted to Govenment.

Money spent and accounted for in detail to Mr. Simms' satisfaction	Rs.	4,629	12	9
Pay during the time	„	3,150	0	0
Total	Rs.	7,779	12	9
Each of the eleven churkas cost then	„	707	4	1
Or exclusive of Mr. Mather's pay	„	420	14	1

In June 1850 Mr. Mather reported his churkas ready, and solicited orders to accompany one set, in order to put it up and set it to work properly. This order was not issued : but I find the following account of the distribution of the churkas :—

Sent to Bombay	10
„ Madras	2
„ Agricultural Society	1
„ Commissioner of Assam	1
„ Arracan	2
„ Tenasserim	12
„ Mr. Marshall, Martaban	1—29 in all.

The Military Board reported in January 1851, that they had sixty-seven still in store, and asked for instructions as to their disposal. They had been offered for sale by public auction, but withdrawn, as only 5 Rupees were bid.

In October 1852 an account of the total cost of these ninety-six churkas was given.

Cash received by Mr. Mather	Rs.	6,094	8	9
Brass and iron-work furnished from Cossipore factory	„	1,750	4	4
Stores furnished from the iron bridge yard...	„	101	10	9
Salaries...	„	7,200	0	0
Wear and tear of machinery, tools, &c.... ...	„	2,397	2	4
Balance due to Mr. Mather by account furnished	„	3,912	5	0
Total,	Rs.	21,455	15	2

Making the cost of each churka Rupees 235. But as Mr. Mather shortly after left the country without having received this balance, the nett cost was Rupees 17,543-10-2, or Rupees 193-4-5 for each churka.

Several officers to whom the churkas were sent subsequently reported on them.

Mr. J. Sandow, of Broach, said that the churka was but a very slightly modified form of one sent from Glasgow in 1839, and which had been at that time rejected after careful trial: the present machine was in no respect superior: and the common native churka was in every respect, save only in price, its equal.

Mr. Vary, of Sattara, says, that Mr. Mather's churka is a very slight, if any, improvement on the common native instrument, and of course quite unable to compare with the saw gin.

Captain Wingate, Revenue Survey Commissioner of Belgaum, speaks of it as a poor adaptation of the native churka. He exclaims at the price, which he believed to be only Rupees 80, as excessive: he compared it at work with a churka made by Mr. Frost and sold for Rupees 15; he describes in detail the difference of construction between them, dwelling on the marked superiority of the latter in several ways; in actual out-turn it had the advantage of 50 per cent.

Mr. Blount, of the South Maharatta country, thought that it was not more effective than the common native churka; it was similar to one constructed by Mr. Burn, and worked at Dharwar in 1848; the brush appended to both these instruments he considers perfectly useless, and merely adding a disadvantageous complication to the machine.

The Bengal officers to whom any had been supplied, in vain attempted to induce any one in their various districts to buy or accept the churkas.

Finally, they were advertised for sale in Calcutta, and an order given to get rid of the remaining sixty-seven at auction to the highest bidder.

In September 1848, Mr. Hugh Flemming, Secretary, and Mr. M. Ross, President of the Manchester Commercial Association, addressed the Court of Directors on the subject of "cottage saw gins."

In October Dr. F. Royle reported on them: he had gone down to Manchester for the purpose of examining them: and after several careful trials he had selected two out of four exhibited, as best suited to India.

All four were about the same size, 33 + 27 + 6½ inches: all were worked by the hand, and fed by the worker, easily repaired if broken, and of simple construction: they were tried with both American and Indian seed Cotton.

1st.—Was exclusively of wood, and was moved by bands and wheels.

2nd.—Was partly of iron, and was similarly moved.

3rd.—Was moved by cog wheels.

4th.—By a pinion and wheel, which Dr. Royle did not approve of.

Each of those he selected turned out 31 per cent. of clean to raw Cotton on trial.

1st.—Turning out 17lbs. per hour; and, *2nd.*—Cleaning 20 lbs. The ordinary Indian churka turns out 25 per cent. of clean Cotton.* The American gins in Southern India only 22 per cent.

---

* Elsewhere the percentage of clean to seed Cotton is spoken of as varying (and very widely) according to the kind of Cotton, however cleaned.

Dr. Royle strongly recommends the gins, and forty-eighty of them were sent to India in 1849.

In February 1850 Mr. Price tried one of them at Dacca: he says that it worked very well with the American and Bourbon Cottons, but that the gratings were too wide for the small size of the seed of the Indian Cotton, these passed through them, and got mixed with the ginned Cotton. He says this is a fault easily remedied.

Mr. Bell, of Agra, tried one in May: he did not find that the seeds of his Cottton passed through the gratings, but the staple was so much cut up by the saws as to be quite unfit for spinning: the instrument does not he thinks merit attention, and will not meet acceptance. Mr. Price found that three laborers, employed working it during nine and a half hours, could do the work of thirty churkas, that is, the cottage gin, worked for nine and a half hours, turned out 60 lbs. of clean Cotton from 180 lbs. of seed Cotton, whereas the Dacca churka, when worked for twelve hours, can only turn out 2 lbs. of clean Cotton from 6 of the raw produce; he seems to imply that the latter is the work of one individual.

With regard to the native churka there appears to be great difference in the work it is capable of doing in different parts of India. The following particulars have been placed on record :—

Coimbatore.—From 4½ to 6 lbs. of clean Cotton are passed through the churka in a day by a single laborer, being from 23 to 25 per cent. of the raw produce employed.

1½*d.* per 25 lbs. of seed Cotton cleaned is paid.

Tinnevelly.—The value of the churka is six annas: one anna is paid for cleaning 25 lbs. of raw produce, about 20 lbs. per day being the ordinary rate of work, of which 5 lbs. is clean Cotton and 15 lbs. seed and refuse.

Assam.—The churka costs from one to two Rupees.

Malwah.—The churka costs one Rupee eight annas: two annas per day is paid to the laborer, who cleans 60 lbs. of raw Cotton, from which he turns out 15 to 16 lbs. of clean.

CSL

Rutlam.—Churka worth about twelve annas; four to six annas per day is paid to laborer, who cleans 64 lbs. of raw produce, yielding 18 lbs. of clean Cotton.

Nimar.—The churka costs one Rupee four annas: two persons work it together, and receive one anna each per day, 48 lbs. of raw turning out 12 lbs. of clean Cotton, is considered a day's work.

It is common also to contract for the cleaning of 192 lbs. of raw Cotton for a Rupee: sometimes half an anna per seer of raw Cotton is given, and sometimes the seed is taken for the labor: and the person giving the raw Cotton expects to receive one-fourth of its weight back clean.

Berar.—The churka costs 2 Rupees. The Cotton is cleaned by job work, generally at the rate of Rupees 2-8 per 240 lbs., the proportion of clean to seed Cotton is a little less than one-fourth, 778 lbs. of the latter yielding 180 lbs. of the former.

Agra.—Value of the churka is six to eight annas: the laborer gets an anna and a half per day, and the average out-turn is 8 lbs. per hand: some women employed by Mr. Bell used to clean 10 or 11 lbs. in a day, and a few men as much as 16 lbs.

The percentage of clean Cotton in the raw produce varies from 25 to 40.

In September 1849 Government authorized the Agricultural Society to offer a prize of Rupees 5,000 for the best machine of any kind for cleaning Indian Cotton, to be delivered at Metcalfe Hall before the 1st March 1852, the conditions were advertised, and four machines competed.

The Committee investigated with minute care the claims of the different machines, and an elaborate report of the trials was published. The following is a brief abstract of the result:

1st.—Carver and Co., Massachusets—a saw gin.

This machine was not worked on trial at the speed required in the nstructions which accompanied it: the Committee were of opinion that had it been practicable to do so, the out-turn specified by the makers would have been made, namely, 75 lbs. of clean Cotton per hour. At the rate attained the actual out-turn was 22 lbs. of clean Cotton per hour; the Assam seed Cotton was of a character calculated to put a machine of this kind to a very severe trial, but the staple was turned out perfectly uninjured and very clean.

The machine costs about 200 dollars.

2nd.—Bates, Hyde and Co., Massachusets—a saw gin.

This is a cheaper machine, worth 70 dollars, it is well made, simple, and smaller than the other. It was not worked at the indicated speed, but the result of the trial was quite as satisfactory as in the case of the former machine: the Cotton was turned out very clean, and completely uninjured in staple.

The estimated yield (in the description) was 25 lbs. per hour. On actual trial it gave 8 lbs.

3rd.—Mr. Frost, of Dharwar—a saw gin.

This machine contained fewer saws, and worked more lightly than the American gins, which rendered a greater speed attainable on the trial, and it consequently did more work in proportion to the number of feet of saw teeth which it contained than either of the others: it did not, however, clean the Cotton so well, more fibre was left adhering to the seed, and the result was not equal.

4th.—Mr. Mornay, Calcutta—a churka.

This instrument was not considered as rightly entering into competition with the others.

The general conclusions announced by the Committee were that, machinery now exists capable of preparing to the best possible advantage Indian short-staple Cotton for the market. That mechanical ingenuity had in fact thoroughly performed its part: and that, if Indian Cotton cleaned in these machines be still found unsaleable, improved cultivation must be looked to to do the rest.

CSL

That these machines are all costly, and can only be worked really to advantage by steam or water power: and that it may be considered as impossible to construct any machine, of whatever material, whether on the churka, saw gin, or any other principle, with any pretensions to good workmanship, at a price which would enable the ordinary Indian villager to use it: that the idea may as well be abandoned: and that the only way in which properly cleaned Cotton can ever be obtained in marketable quantities is by establishing such machines as these at stations in the Cotton-growing countries.

Within the last two years this decision seems to be under reconsideration: at least some of the newest Cotton-cleaning machines appear to revert to the smaller type.

MINISTRY OF CULTURE · GOVERNMENT OF INDIA
सत्यमेव जयते
संस्कृति मंत्रालय · भारत सरकार
CSL

PART III.

Section I.

CHEMICAL PAPERS, TREATING OF SOILS, MANURES, AND THE COMPOSITION OF THE PLANT ITSELF.

It will be obvious to any one who reflects on the importance of the Cotton crop in America, and the activity with which in that country agricultural chemistry has been studied, that a large amount of matter bearing on these subjects might easily be collected. But as the details, descriptive of varieties of the plant, and differences of soils found in the American Cotton fields, could not be supposed to be of practical utility in India, a single specimen of many essays on such subjects is selected, treating of a typical locality and variety, which will, it is believed, be as much as any ordinary student of this subject in this country would care to peruse, whereas any one intending to go more deeply into it, would in any case seek information in the original publications.

Mr. Piddington's papers of course find a place, as the works of the only Chemist who seems to have directed his attention to such subjects in India.

Dr. Royle applied to India some work based on analyses of American specimens, and the authority attaching to all he writes on the subject will render the extract from his book interesting.

There seems indeed to be a general impression among those whose opinion is best entitled to respect, to the effect that by far the greater number of the many varieties under which soils are descriptively classed by the Chemist, can be made to grow Cotton under favorable circumstances of climate, and by judicious culture: this has been very often asserted by those who have given much attention to the subject, but at the same time, it will not be out of place to reproduce here some of the results arrived at by persons who have examined into the subject, in the belief that careful attention might, with advantage, be paid to minute details.

On soils Suitable for Cotton, by H. Piddington.

Read before the Agricultural Society, 1832.*

I preface what I have to say to the Society on the soils placed on the table, with a few remarks, which I trust may be thought worthy of being

---

* Agricultural Transactions, Vol. III., page 31.

CSL

placed on record. My object in doing so is to impress upon the members of what vital importance it is to the advancement of the agricultural interests of the country, and to the safety and success of every agricultural speculation, to procure samples of all soils from other countries in which valuable products grow.

The same climate and soil are, we know, in a greater or less degree, the essential requisites for obtaining the productions of one country in another: and for our present purpose we may perhaps say that plants find their food in the soil, and are enabled to digest it by the climate. They do digest, we know, and this in the strictest sense of the word.

The popular ideas of climate are vague enough, but it may be roundly asserted that scarcely one who uses the word knows what is really meant by soil : or rather what is really meant by *the same soil :* this arises from our vague notion of the thing itself.

The very words used to distinguish soils express more frequently than any thing else their appearance, and some of their physical qualities: scarcely any their essential, that is, their chemical properties. We talk of light and heavy, of sandy and clayey, moist and dry soils, which are all physical properties, and two sandy and two clayey soils may be actually as different as light and darkness from each other. The words ferruginous and calcareous are, it is true, chemical terms, but such vague ones, that they designate whole classes of soils, of which each sort is widely different from its neighbors.

Nothing then, but a sample of the soil and a correct analysis of it, can assure the speculator, that while he is trying to rear any given foreign produce, he is not (misled by loose names) absolutely blundering in darkness and attempting an impossibility.

I begin with Cotton as a most prominent example, though my proofs on the subject are not quite so full as I could wish : and I shall surprise the Society not a little when I say that all the expensive efforts which have been made hitherto to obtain good Cotton have probably failed from this one

CSL

cause, that we have been at work on the wrong soil. How far with American Cottons differences of climate may also have operated, this is not the place to examine, but vegetable productions do, to a great extent, acclimate themselves: while it is probable that nothing can compensate to them the want of a principle constituent in the soil. Now, I have not been able to obtain specimens of the American Cotton soils, but I have good authority for stating that the soil of the Sea Island is wholly a calcareous soil, in other words, a light chalky or shelly soil: so that it may probably contain from 50 to 60 per cent. of calcareous matter (lime, generally, in a state of chalk), and we have been attempting to grow this Cotton on a soil which barely contains a trace of it. The soil of the botanical gardens, for instance, not containing more than 1½ or 2 per cent.

Indeed, we may say generally, that until we reach the kunkur districts, none of the soils of Lower Bengal, out of reach of the inundations, contain any great portion of lime. I showed some years ago that the inundations deposit lime, and that much of their fertilizing effect is due to this.

The American Cotton is then, on account of differences of climate, a case not strictly in point: but the Bourbon Cotton, grown at Bourbon and the Mauritius, which sells for a shilling, when the Sea Island sells for 13½*d.*; and the Manilla Cotton, which sells for 11*d.*, when the Bourbon is worth a shilling, are both Cottons of hot climates like our own: and both these are grown in highly calcareous soils.

The soil on the table before you is from the Mauritius: it is sent me by Mr. Génève of la RivièreNoire, one of the finest estates on the island, as an excellent Cotton soil, and contains 32 per cent. of carbonate of lime, or, in plain English, one-third chalk; there is, moreover, phosphate, and perhaps sulphate of lime: altogether, perhaps, not less than 50 per cent. of calcareous matter: its iron, too, is in a peculiar state, that of protoxide or the black oxide of iron: and in this respect it probably resembles the black Cotton soils of Southern India: no wonder that the Bourbon Cotton, though it grows well in many of our gardens near town, where it meets with plenty of calcareous matter among the lime rubbish with which most of them are filled, is said to degenerate when cultivated in the open fields which do not contain 2 per cent. of lime. I know from the experience of several years, that it does not degenerate if it is duly supplied with calcareous matter, but that it will produce most abundantly, and for years, Cotton worth 10*d.* to 11*d.* per lb. in a proper soil. If the soil does not suit it, it will produce little else than leaves and wood, and the staple will deteriorate.

Samples of American Cotton soils are wanting now to make our theory on this head perfect: but I would advise no man to attempt foreign Cottons on a soil containing less than 15 per cent. of lime, and its iron mostly in the state of protoxide or black oxide.*

On the Chemical Examination of Cotton Soils from North America, India, the Mauritius, and Singapore, with some practical deductions, by HENRY PIDDINGTON.†

IN a paper which the Agricultural and Horticultural Society did me the honor to publish,‡ I adverted to the Cotton soils of America in these words :—"Now I have not been able to obtain specimens of the American

---

* Mr. Finnie—*Papers relative to measures taken for procuring the Cultivation of Cotton in India, No. 119, Parliamentary Return, 21st May* 1847—writes thus :—" One scientific " analyser of soils gravely states that *the cause of failure in all the expensive efforts which* " *have been tried is, that we have been at work on the wrong soil.* Doctor, lock up your chemical tests, and locate yourself where the climate is favorable, and commence on any soil you " please, and you will make Cotton, if you plough and hoe it properly : this analyser of soils " again adds, *and I advise my friends not to attempt Cotton on a soil that contains* 15 *per* " *cent. of lime.* Doctor, how much lime does Cotton seed contain ? not a particle : well, Sir, " I can take a clay bank and add 15 per cent. of Cotton seed, and make good Cotton on it, if " the climate suits it."

† Agricultural Transactions, Vol. VI., page 198.

‡ The above paper is alluded to.

CSL

" Cotton soils, but I have good authority for stating that the soil of the " Sea Island is wholly a calcareous sand, in other words, a light chalky " or shelly soil, so that it may probably contain 50 or 60 per cent. of " calcareous matter."

And again, " But I would advise no man to attempt foreign Cottons " in a soil containing less than 15 per cent. of lime, and its iron mostly " in the state of protoxide or black oxide."

Having, by the kindness of my American friends, been able to obtain specimens of the Sea Island and Upland Cotton soils of Georgia, and Carolina, from three of the best plantations, I have thought the facts elicited by their examination in comparison with those of India, the Mauritius, and Singapore, well worth publishing.

The successful cultivation of good Cotton is of such immense importance to India—it may indeed be called a question of millions to us, that no lights which can serve to direct our efforts into the proper channels, or save us from the expense and discouragement of unsuccessful trials, can be indifferent: I commence with a sample of:—

I. Sea Island Cotton Soil from Georgia.

The label sent with this specimen is as follows:—

" In order to view this soil as it is, wet it, as though a shower of rain " had fallen upon it."

The appearance of this soil, when dry, is certainly very singular: it may be described as appearing like a mixture of fine dark-grey sand and charcoal dust, with fragments of shells, wood, twigs, leaves, and even the shells of Cotton seeds, the wood being in all states, from dry to charred, as if the rubbish of the Cotton bushes had been burned on the spot. Upon sifting nine ounces of the soil taken fairly from the specimen sent, through muslin, it was found that eight ounces of it was fine sand mixed with fine charcoal-looking dust, and the remaining ounce coarse sand, with a few fragments of sandstone in thin horizontal layers, shells in fragments, with wood and vegetable rubbish, as described above.

It is unfortunately not mentioned in the label, nor in the letter, whether this is merely surface soil, or a specimen taken a little below it; I assume it, from the rubbish, to be merely surface soil. The wood and twigs are evidently the remains of Cotton plants.

We would also at first sight be inclined to suppose that the charcoal-like dust is derived from the burned bushes; but, independent of its quantity, and that wood of any kind burned in the open air, would be mostly reduced to white ash, I found upon agitating a quantity of the soil in a tall glass jar, that a part of the black matter is dense enough to settle quickly after the sand, the remainder requires some time to repose, and in one instance the dark layers formed three-fourteenths of the bulk of the soil by measure: a portion of it was no doubt black sand. The sand below, when thus wet, and freed from black particles, has a dirty brown or greenish-grey color. I note some reasons for supposing this carbonaceous-looking matter to be derived from lignite, that is, fossil wood half reduced to the state of coal, and this conjecture seems confirmed by the chemical examination; but the question of how deep this singular soil may extend, which is one of great interest, can only be decided by obtaining some of the sub-soil, say at 2 feet below the surface; and it is one instance of the importance of obtaining in all cases specimens of both the surface and under-soil.

The fragments of shells I found to be wholly of the mother-of-pearl sort, which, until burnt, effervesces but sparingly with acids, owing to the membranes which cover the calcareous matter. They are not in sufficient quantity to entitle the soil to the epithet of calcareous, though from their slow decomposition they would furnish the soil with calcareous matter for centuries. The soil also contains some lime

CSL

independent of these, and muriate of lime is one of the saline matters found in it.

I have stated above, that I found one-ninth of the soil, by weight, to consist of matters which must be too variable in their occurrence and quantities to be considered a part of the soil, *i. e.*, the shells, carbonized wood, coarse sand, &c., &c. They, no doubt, by slow decomposition, influence and amend the soil, but these effects are too remote and obscure for us, in the present state of our knowledge of agricultural chemistry, to take account of: and the analyses which follow relate, it will be understood, to the sifted and finely divided portion of the soil.

Three-fourteenths *in bulk* of it was found, as before said, to consist of dark charcoal-looking matter, but some of this was very dense, and settled immediately after the sand. It was probably only sand colored by the black oxide of iron, and a little of the carbonaceous matter. Upon separating carefully the light upper layer, it was found, when dried, to be a dark, slaty, black powder, and upon burning some of it in a glass tube, the peaty, acrid, and highly disagreeable smoke, which characterizes the peats and lignites, and which all who have smelt a peat fire can recognize, was plentifully evolved; silver leaf and litmus paper were discolored, a dense smoke evolved, and a brown, oily, acrid, and smoky-tasted matter deposited on the upper part of the matrass. Cold water left for a day or two upon a portion of it was tinged of a pale yellowish color, and left a brown extractive matter when evaporated. Alcohol digested upon it acquired but a faint tinge, and left but an insignificant residuum, which was probably what its water had taken up. It follows, then, that a portion of the dark sediment is, as I have suggested, lignite, a peaty matter in a state of very fine powder; and as it is so intimately mixed with the soil, and forms, as to bulk, a considerable portion of it, we may suppose that it essentially modifies its properties. The facility with which it colors water is much in favor of its being important to the growth of the plant, and the peculiar quality of the

CSL

Cotton. I found that the fine sifted parts of the soil, as before mentioned, contained in 100 parts :—

Saline matter, muriates of lime and soda, but no potass	0·20
Vegetable matter, mostly lignite or peaty powder, with a little water	3·20
Iron (protoxide)	1·00
Lime	2·76
Alumina	0·20
Silex	92·00
Water and loss	·85
	100·00

The saline matter is wholly composed of muriates of lime and soda : no sulphates or potass could be detected, though these are seldom absent from inland soils. It was to be looked for, indeed, that soda would take the place of potass in a marine soil. The saline matters, trifling as their proportion appear, are always considered of importance to the crop. In appreciating this soil we must make allowance for the broken shells which are always slowly decomposing and furnishing fresh calcareous matter to the soil.

These have been excluded in the sifting, but it will be remarked that this and the following analysis of another soil do not show the soil to be so calcareous as I had been led to suppose. The examination was indeed repeated to guard against error in this respect, and to be assured also that the proportion, by weight, of the peaty matter, which appears so large by bulk, was correct.

Another peculiarity of this soil was the state of the silex : in many of the soils of Bengal, and indeed in all soils, the origin of which is *decomposed* rocks of any sort, the silex is contained for the most part in the state of an impalpable white powder : or, in other words, like fine flint dust. When the soil, on the contrary, is derived from *disintegrated* rocks, the silex is in coarse grains, like coarsely broken flint. In this the silex was almost wholly of the latter description, being in bright white grains, like pounded loaf-sugar. It is essential to remark this, for silex, that is, flint, in coarse grains, and silex in fine dust, must act very different parts in the soil both as regards its relation to moisture, its tenacity, and its electrical properties.

II. Sea Island Cotton Soil from Philadelphia.

I have no farther account of this specimen than that it *is* a good Sea Island Cotton soil. Like the former, it is evidently from the surface, being full of rubbish, fragments and roots of grasses, which indicates it as such. It differs, too, from the foregoing, in being of a tolerably uniform brown color when sifted.

When agitated with water, a portion of fine brown matter is slowly deposited on the more dense sandy particles, and this the test of burning showed to be like the black powder of the first specimen, a peaty substance, which affords the same acrid smoke and oily deposit, and discolors silver foil and litmus paper: it is evidently a brown lignite or peaty powder: the lignites and peats running by insensible gradations into each other. The water is very slightly discolored.

When sifted, about one-eighth of the soil is found to be composed as above, of coarse sand, vegetable rubbish, fragments of shells, &c. The analysis gave in 100 parts :—

Extractive and saline matter (muriate of lime and muriate of soda) but no potass	0·60
Vegetable matter, mostly lignite, or peat in powder	5·00
Iron (protoxide)	1·30
Carbonate of lime	4·00
Alumina	0·63
Silex in coarse grains	88·02
Water and loss	·44
	100·00

This soil, which is from the surface, approaches in appearance to what, from the descriptions, we should suppose to be the *Regur*, or black Cotton soil of Southern or Central India, which I have not seen: perhaps, indeed, it is identical with it. Its appearance, when dry, is that of a dark-brown, heavy clay, interspersed with small white nodules, which are soft kunkur, so that the whole is easily pulverized. It forms with water a tenacious clay, and dries into tough lumps, giving every indication of being what the black Cotton soil is described to be, namely, " a soil formed " by the decomposition of trap rocks, forming a tenacious mud in the " rains, and drying into a hard black clay, crossed by innumerable fissures " and cracks in the hot winds."

When heated in the matrass, a striking difference appears between this and the American soils, in the total absence of any trace of lignite or peaty matters. It gives out nothing but pure water, with scarcely any smoke or smell, and with no effect whatever on the silver foil and litmus paper enclosed in the tube. In calcination, too, its darkest appearance is a dull lead-grey color, and, as will be seen, its vegetable matters does not exceed 2 per cent. The proportion of lime throughout is far above that of the American soils, being 12 per cent., while the highest of these is only 4 per cent. The silex, too, is in the state of a fine powder, evidently showing it to have been derived from the *decomposition*, and not from the *disintegration* of rocks: 100 parts gave

		Dr. Spry from Qobur Soil.
Extractive matter, with a trace of carbonate of soda ...	0·33	2·15
Vegetable matter and water...	2·00	
Deutoxide of iron...	7·75	6·05
Carbonate of lime	11·90	8·25
Alumina	3·10	4·40
Silex	73·00	74·15
Water and loss	1·00	6·10
	100·00	100·00

V. *Coimbatore or Oopum Cotton Soil from Southern India.*

This soil, with many others of various sorts, to which I have not been able to pay due attention, was kindly sent me by Dr. Wight. He was not able to obtain any notes upon it, farther than that it is considered one of the best Cotton soils in Southern India.

In appearance it seems also to be a variety of the *Regur* or black Cotton soil, being of a dull black color, and highly tenacious consistency, but modified in this respect by the intermixture of a quantity of gravel, of felspar, and silex, but not of kunkur. This gravel forms about one-eighth of the weight of the specimen sent me, which was a very minute one, not exceeding half an ounce, so that I am precluded from giving a more extended detail of its appearance and sensible properties.

Like the Bundelkhund soil, it yields only pure water when heated in the matrass, not discoloring test paper or silver foil, and the only saline matter found in it was a minute portion of muriate of line : 100 parts gave

Vegetable matter, with a little water	2·30	
Saline matter (muriate of lime, no potass or sulphate present)	......	traces.
Carbonate of lime	7·50	
Magnesia	......	„
Protoxide of iron	4·00	
Alumina	2·80	
Silex	82·80	
Loss	·60	
	100·00	

VI. *Soil on which the Bourbon Seed is cultivated, from Southern India, Tinnevelly District.*

Some of the Cotton grown on this soil has realized as high as 11*d.* per lb., or even more.

CSL

III. *Upland Georgia Cotton Soil.*

This, too, is evidently from the surface, and in appearance much resembles our common light fawn-colored sandy soils of Lower Bengal: but upon sifting it was found that nearly one-half by weight was coarse granitic sand, mostly silex, with a few minute fragments of felspar and shells: the last too small to afford any idea of what genera they belonged to. There were also some vegetable remains, mostly from Cotton bushes, and as before, the part which passed through the muslin sifter is taken for analysis, the rest being looked upon as rather rock, slowly decomposing and disintegrating, than as soil, now serving to the growth of the plant. Upon agitating a quantity of this sifted part in water, no difference of color appeared as it settled; but, as usual, the finest part settled last, and in twenty-four hours the water was slightly tinged. Upon heating a portion in a matrass, the burnt smell of the peats and lingites was evolved, and it discolored litmus paper and silver foil, depositing the brown oily matter in the upper part of the tube, thus establishing a close analogy with the Sea Island soils.

Its light color indicates that the lignite or peat is not of the black kinds, and that its iron is probably in the state of protoxide.

There were no saline matters found in this soil: the water in which it was boiled had a light brownish yellow tinge, which, upon evaporation, was found to be occasioned wholly by a brown extractive matter or *geine*, with a minute trace of lime only. No potass, muriates, or soda were present. The analysis gave in 100 parts:—

Extractive matter, but no saline	0·10
Vegetable matter, peat or lignite	4·60
Iron protoxide	1·25
Alumina	1·00
Carbonate of lime	2·90
Silex, coarse grains	89·35
Water and loss	·75
	100·00

CSL

It is very remarkable as showing the wonderfully minute state of division in which the vegetable matter is diffused throughout this soil, that though by weight it constitutes only 4·60 per cent. of it, yet at one period of the calcination, which is the process of ascertaining this, the whole contents of the crucible seemed changed into ivory black.

It follows then that, so to speak, every fibre of the roots of the plant and every drop of water in the soil must come into contact with an atom of this substance: a strong presumption of its great importance in modifying the food, and consequently the production of the plant. The absence of all saline matter, too, is a matter of very great interest, for it shows that on upland soils certainly, and, perhaps, indeed, probably, on the Sea Island, the production of fine Cotton does not depend on the presence of any peculiar salts: and we thus arrive a step nearer to knowing with certainty on what it does depend.

IV. Best kind of Cotton Soil from Bundelkhund.

Note accompanying the specimens :—

"The inequality of surface throughout Bundelkhund is a matter of "notoriety, and lands well calculated to yield a good crop from the "nature of the soil, are often rendered useless for the growth of Cotton, "by the quantity of water which they retain, in consequence of being "on a lower level than the adjoining fields. The soil varies consider-"ably, and may be classed as follows :—

"1.—*Mar*, which is a black soil, and the most productive in the country.

"2.—*Qobur*, containing a mixture of black soil and sand.

"3.—*Pundoah*, of a reddish color, and clayey.

"The order in which I have mentioned the different kinds of soil "is that according to which they are valuable for arable purposes. That "which I now send you is of the first class, and best suited to Cotton, "provided it does not lie low so as to retain the water."

The appearance of this soil, which is of an entirely different class from the preceding, for its iron is wholly in the state of peroxide or red oxide, with, perhaps, a little corbonate of iron, is that of a mixture of lime rubbish and yellowish earthy brick dust. The larger nodules of kunkur have the sharp angular points, which this substance so often presents, giving it somewhat a mamillate form. It may, in fact, be called coarse, yellowish-red soil, intermixed with kunkur in small nodules and fragments; when sifted, almost the whole of the coarse part is found to consist of the kunkur, with a few fragments of felspar, silex, and aluminous earth. The finer part was a coarse yellowish-red powder, speckled with white fragments of the kunkur, and as only about one-half of it passed through the sifter, we may say that it is composed of equal parts of the coarse fragments and of the finer powder : which last is the analyzed portion.

In the matrass this soil evolves nothing but pure water, not discoloring test paper nor silver foil ; a minute portion of muriate of lime and sulphate of soda also exist in it, and from the appearance of it, and its change in the crucible, I should infer a portion of the iron to be carbonate of iron; for it at first takes a dark ash color, and then calcines to a dull red, which is the usual appearance shown by this substance: 100 parts contain

Extractive (geine) and saline matter ; the latter muriate of lime and sulphate of soda	0·20
Vegetable matter	0·15
Peroxide (and carbonate) of iron	19·50
Magnesia	0·15
Alumina	2·00
Silex	74·00
Loss	1·12
	100·00

CSL

VII. Cotton Soil of the best quality from the Mauritius.

Labelled—"Soil from near the sea shore, good for cane, superior for Cotton."

This is also quite different from the others, I mean of a different class. Its appearance is that of a dull, black soil, intermixed with a very large proportion of white fragments, small and large, some appearing to be remains of shells, but most of rock.

There is also a considerable number of dark-colored pebbles rolled and in fragments, which seem to be portions of the soil indurated by iron, and much resembling minute nodules of Kidney iron ore.

There are also fragments of vegetable remains, having somewhat the appearance of brown lignite.

When agitated with cold water, it discolors it almost as much as the Sea Island Cotton soil, No. I., and like it, too, a part is very fine, dark-brown powder, slowly settling: when heated in a matrass, it gives out a faint peaty odor, but of a more earthy kind than the Sea-Island, and the test paper and silver foil are not immediately discolored by it: upon calcining it blackens very considerably. When sifted, about one-third is coarse gravel, of which at least three parts are calcareous fragments, the remainder the indurated nodules, &c., and fragments of lignite described above. The saline matters, which were less abundant than would have been looked for in such a situation, were only muriate of soda and lime, without any sulphates or potass: 100 parts contain

Saline and extractive matter, the salts muriate of soda and muriate of lime	0·30
Vegetable matter	1·75
Protoxide of iron	9·15
Carbonate of lime	40.85
Magnesia...	a trace
Alumina	2·90
Sliex, mostly coarse-grained	43·60
Water and loss	1·15
	100·00

VIII. Best Singapore Cotton Soil.

On this the Bourbon Cotton thrives remarkably, and produces fine Cotton; but there is but little land of the kind known on the island.

The appearance of this specimen is very remarkable; it consists apparently of large coarse grains of white sand, mixed with coarse charcoal dust and fragments of vegetables and mosses of all sorts: being, in fact, as to appearance, what we might suppose the Sea Island soil to have been before it was reduced to a finer state. When sifted, indeed, it almost exactly resembles the Sea Island No. I., except that the sand being white, renders the contrast between it and the carbonaceous dust more striking. About one-third of it was coarse silicious gravel, without felspar, or fragments of shells, and with a few remains of carbonized wood, roots, and moss intermixed with it. It was both a curious and beautiful result, to find upon examination, too, that, like the best Sea Island soil, it strongly discolored cold water, gave out the peaty smell, deposited a brown oily substance on the tube, and discolored litmus paper and silver foil when heated.

So that we have absolutely here soils from opposite sides of the globe, containing a peculiar substance, which is not to be mistaken, both producing Cotton of special fineness, and such as those soils only will produce in their respective countries: a strong evidence this, to the merely practical man, of the use and faithfulness of our researches: 100 parts gave

Vegetable matter, mostly peaty	9·15
Saline and extractive, the saline matter being only traces of sulphate and muriate of potass	0·60
Iron	0·25
Carbonate of lime	1·25
Silex, mostly coarse-grained	88·20
Water and loss	0·55
	100·00

This soil is instructive in other points of view, for the absence of iron shows us that this is not the essential in soils to the production of good Cotton, and the very minute traces of saline matter confirm the same remark as made upon analysis No. I., namely, that these two are not of primary importance. We find, too, that the carbonate of lime is in such very small proportion, that we may consider this soil as a mixture of silex and vegetable matter, this latter being in a very soluble state.

IX. Inferior Singapore Cotton Soil.

This yields Cotton inferior to that gown on No. VIII. It is a coarse-looking, white sand, with about one-fourth of it gravel, which is all silicious, too coarse to pass the sifter; intermixed with it are very few fragments of carbonized moss, and minute particles of carbonaceous matter.

In small quantities,—and I had but very little of it,—it does not sensibly discolor cold water, but though, as will be seen, its carbonaceous matter only forms by weight one-hundredth part of the soil, yet, upon heating it in a matrass, the peaty smell is evolved, the silver foil discolored, and the oily matter deposited in the tube.

The litmus paper is also discolored; if the tube be kept closed for a few hours, so that we find it, like the preceding one, to belong to that class of Cotton soils which possess peaty matter: and it seems almost as if this was an experimental soil formed by the hand of Nature for us, to show that this substance alone is sufficient to the subsistence of the plant and the production of passable Cotton: for we may call it, in fact, pure silicious gravel and sand, with only 1 per cent. of peaty vegetable matter: the iron and lime together, not amounting to fifteen-hundreths of a grain in 100 grains, so that, as before remarked, neither the saline

CSL

matter, nor the iron, nor the lime are essential ingredients to the mere production of Cotton: 100 parts gave

Vegetable matter, probably all peaty...	1·00
Iron and carbonate of lime	·15
Silex, coarse-grained	98·83
	100·00

From these analyses we see that all the American, the Mauritius, and the best Singapore soil producing the finest Cotton, contain a considerable percentage of vegetable matter under the form of peat or lignites, in a state of exceedingly minute sub-division, and in many of them, some of it easily soluble in water. We see, too, that the Indian soils contain very little vegetable matter, and this wholly insoluble in water; but that the best contain a far larger proportion of carbonate of lime, and some of them their iron in a different state from others, though it would partly seem that the plant is indifferent about the iron. Still, as we do not know what is the part which the iron plays in soil, (it may be as influencing their electricity as well as their tenacity and relations to moisture,) we must always keep this in mind as a matter to be enquired into.

I have remarked that we do not certainly know what plants feed upon, nor entirely how they feed, that is, by their leaves or roots. What we know is that many substances are taken up and absorbed by the roots and leaves; and that a system of excretion is constantly going on, by which many of these substances or some of their elements are thrown off, while others remain fixed as parts of the plant: and when we desire to obtain any particular substance from a plant, we look to find it or its elements most abounding in the best soils for it. With Cotton this element is carbon, or, in plain English, charcoal, of which its solid matter is almost wholly composed. Its seed, which is very oily, contains also a considerable proportion of hydrogen united to carbon, which is the basis of the oils, and for what we know yet, the quantity and quality of the Cotton may depend upon the vigor and nourishment

CSL

of the seed; and it is quite possible that in the peaty matter of the best soils, the plant may find the carbon united to the hydrogen ready for its nourishment. The size of the Sea Island seed is very remarkable, and seems to lend some countenance to this idea, and if it was, as is supposed by some, originally from Bourbon, it has nearly doubled; I do not know if it has decreased in number.

Assuming, however, for our present purpose, that the quality and quantity of the Cotton depends upon the supply of carbon to the plant, we find that in the best, that is, the American, No. VIII. from Singapore, and the Mauritius soils, the plant finds not only carbon in a highly soluble state, but probably also the hydrogen united to it in the peaty matter: while those next in value possess also larger shares of carbon, but without the hydrogen, which the plant must now obtain from the water of the soil, and that the carbon itself is in a state requiring a decomposing process before it is fitted to become food for the plant, for it is now bound up with the lime in a state of carbonate of lime: that is, that the carbonate of lime,—in plain English, the marble, chalk, or kunkur,—is composed of 12 per cent. of carbon, 32 per cent. of oxygen, and 56 per cent. of caustic lime: so that the 12 per cent. of carbonate of lime, which we see contained in the Bundelkhund soil, contains 6·72 of caustic lime, and 5·28 per cent. of carbonic acid, and this last again is decomposable into 1·44 per cent. of carbon and 3·84 per cent. of oxygen: the soil, then, may be said to have this quantity of carbon, that is 1·44 per cent. for the supply of the plant. This will not seem far fetched when we reflect that every drop of rain which meets with a particle of kunkur dissolves a minute portion of its calcareous matter by the excess of its carbonic acid, and carries it in solution to the plant. It follows then that, as I supposed, the lime in the soil is, though not indispensable, yet highly useful, because of the carbon which is always united with it: the lime, if any is taken up, serving only perhaps as a stimulus to its digestion.

I am not wholly writing here from theory, but am enabled, in addition to the various proofs the Singapore soils afford us, to prove something from practice. I brought from Singapore, where I superintended for a short time the H. E. I. Company's garden in 1822, seeds of the Bourbon Cotton, which had been recently brought there; these I planted in 1823, and cultivated the produce for seven or eight years, not as an object of culture, being then extensively engaged in other pursuits, but as a curiosity and an experiment. At the end of this time, during which I had always good, and often abundant, crops, it was found, on sending samples of the first and last year to Mr. Findlay, of the Gloster mills, that the Cotton had not in the least degenerated, and was worth from 9*d.* to 11*d.* per lb: now the soil in which those plants grew I analyzed and found 100 parts contain

Water	1·00
Saline and extractive matter	0·50
Vegetable matter	0·50
Carbonate of lime	1·00
Peroxide and protoxide of iron	6·00
Silex	84·50
Alumina	5·00
Loss	1·50
	100·00

It therefore contained but exceedingly minute portions of lime and carbonaceous matter, but then the plants were constantly manured every year with the black peaty earth so abundant in the jheels of India, of which an average good specimen contains in 100 parts

Water	1·50
Saline and extractive matter	0·25
Vegetable matter	26·00
Lime	15·00
Deutoxide of iron	9.50
Alumina	8·00
Silex	36·50
Water and loss	3·25
	100·00

Here it is clear that the plant found its supply of carbon from the vegetable peat: and the lime, if it wanted any, from the shells with which this substance abounds.

It occurred to me that there might be found some relation between the whole quantity of carbon in the soils, and the quality, as shown by prices of the Cotton produced upon them, and upon trying it, I find a sufficient general relation to allow of the above result being tabulated.*

I assume, first, that the whole of the vegetable matter destructible by heat, as shown by the analysis, furnishes carbon to the plant, more or less regularly, as it is more or less soluble, and that the remainder is furnished by the carbonate of lime, of which, as 44 are carbonic acid, and one-twelfth of this fraction carbon, we may say, that in round numbers, ·4 per cent. of the whole quantity found is carbon, contributing to the nourishment of the plant and the perfection of its Cotton. Of the extraction (geine) I have not taken notice, considering it always as furnished by the decomposition of the vegetable matter.

Closing here my general observations, I now put into the form of precepts, for the use of the practical agriculturist, what at present appears to me to be the results to be drawn from the foregoing pages. He will not fail to remember that this is not *certain* knowledge—that is, it has been tested by experience, but to a limited extent—but only the amount of what we at present know, and what these researches have, I think, elicited: and that I speak here simply of soils without reference to climate or situation: I suppose the cultivator to have obtained good varieties of the plant.

1. It seems at present that the abundance and fineness of good Cotton depends on the quantity of carbon in the soil, and the solubility of that carbon. We are told that the Sea Island Cotton is so capricious in its growth, that the *same soil* on the farm land, although but a short distance from the sea, will not produce it. To the eye of the cultivator

---

* Mr. Piddington gives a table, showing the arrangement he speaks of.

CSL

these might truly appear to be the *same soil*, but he will easily now see the difference, that is, that there is something in the vegetable matter which colors cold water.

If, therefore, you can obtain a soil approaching to what is spoken of in describing the American soils, that is, containing peaty matter, and lignite, and coloring cold water, this will, no doubt, be the best: because it contains carbon and probably hydrogen combined with it, suitable for the food of the plant.

2. The next best soil is one containing carbonate of lime, as marble, common kunkur, chalk, shells, &c., all of which contain more or less of this, and in India kunkur will most frequently occur. The Bourbon Cotton soil from Southern India is a strong example of this.

3. The soil should not be too tenacious. You will observe that the Bundelkhund No. IV. grows Cotton worth only 4*d.* per lb. All experience, indeed, goes to show that the tenacious soils do not suit fine Cotton: I have had repeated experience of this in Bengal: and on the Bombay side of India I observed that some time ago a Parsee gentleman, Furdonjee Cowasjee, had partly failed, and experienced much loss, in some experiments in Cotton, in consequence of the clayey nature of the soil, which retained too much moisture. In the West Indies the years of drought are far the most favorable to the Cotton crop, and the Singapore soils are instances of Cotton growing in what might be called pure sand with vegetable matter: but we must probably make allowance in these instances for the vicinity of the sea.

4. As to color, we can say but very little: for we have good and fine Cottons, from grey and fawn-colored soils in America, from a black one in the Mauritius, from a red one in Southern India, and from a white one at Singapore. The color is owing to the iron and to the vegetable matter: and something *may* depend on the state of the iron: though we do not know yet what, or how it acts. The Singapore soils, indeed, seem to exclude it as an indispensable element, and the

Bundelkhund one to show that in larger proportions it is objectionable, perhaps increasing their tenacity, unless, as in the case of the Mauritius soil, No. VII., it be also accompanied by a large proportion of lime. We want, in fact, more knowledge on this part of our subject.

5. The state of the silex, that is, the pure sand of the soil, seems certainly of some importance, for we find that in all the best Cotton soils it is *undecomposed*, being in coarse glittering grains, like pounded loaf-sugar: the silex produced from decomposition of rocks being in a fine dusty powder. Hence the coarse sandy soils, if they contain a sufficiency of other ingredients, do not seem objectionable.

So much for the choice of a soil. We have now to consider how to amend those already in use, or desired to be made fit, for the cultivation of Cotton.

MANURES may be conveniently divided into manures for the soil in general, that is, such as amend or alter its texture or properties for a number of years; and manure for particular crops, which we do not look to have benefit from for more than a year or two. I suppose the Indian agriculturist, for whom I am writing, to be desirous of either, as the case may be.

1*st.*—Of manures for both soil and crop. The first to be sought for is perhaps lignite, which abounds in some parts of India: but it should not be forgotten that the lignites, and the inferior sorts of coal, run very much into each other, so that the one may be easily taken for the other, and there is great risk in using the last, for it generally contains iron pyrites, by the decomposition of which sulphate of iron (green copperas) is formed, and this is highly pernicious to plants.

This kind of manure should not be ventured upon extensively without advice from competent persons. If by accident sulphate of iron should be formed in the soil, the remedy is lime, which converts it into sulphate of lime and carbonate of iron, both highly beneficial to plants.

CSL

2nd.—Peat is the next kind of manure. The jheels and many tanks of Lower Bengal and other parts of India abound with the black peaty substance, called in Bengal *bodh muth,* to which I have alluded before. This is probably the best manure either for the soil, or for the plant only, as the supply may be more or less abundant.

3rd.—Kunkur, chalk, or lime of any kind, if not containing magnesia, will be perhaps the cheapest and safest manure for Cotton soils. It should be well pulverized to produce the best effect. If the kunkur is very hard, heating the lumps in a fire without calcining them to lime, and then suddenly quenching them in cold water, will probably make them break easily to pieces.

4th.—For manures only applied to the plant, it is probable that besides those from the farm-yard, wood-ashes and charcoal of all kinds, (excepting perhaps the ashes of *soondry,* and other woods near the sea, which may contain too much muriate or carbonate of soda,) decayed leaves, mud from ditches, &c., will be found the best, and when procurable, oil-cake or fish refuse, both of which are, I believe, used in China for Cotton soils, and even the Cotton seed of the preceding crop, after the oil has been pressed from it, or even if fermented, to prevent its germination, will all be found advantageous. The cultivator should recollect, in a word, that nothing can be amiss which will furnish back to the soil the carbon, that is, vegetable matter, of which the plant is constantly depriving it; and that perhaps he only requires a very little addition to his outlay and trouble when he already has decent Cotton, to make a very large one to his returns. He should not forget, too, that the mere growing of the Cotton is but half his work; that it requires to be carefully classed, and cleaned for market, sorted before it goes to the jennies, and *moted,* that is, picked, to take out specks and yellow particles, which are produced by the oil of bruised seeds: this will add far more to the price than the trouble it costs.

Carbon is contained in the

From "*The Culture and Commerce of Cotton in India,*"

by DR. F. ROYLE.

In enquiring into the nature of the soils best suited to the culture of Cotton, we have first to determine whether we should take the soil of the wild, or that of the cultivated plant as our standard.

There is no doubt that in cultivating a new plant, it is of the first importance to obtain accurate and detailed information respecting the site, soil, and climate in which it is found growing naturally. As, for instance, if we could obtain, and attempt to grow any of the valuable chinconas, or the myrrh tree, or rosewood, in a new situation.

But with a well-cultivated plant the case is different.

In the first place, we are unacquainted with the wild state of many of our most extensively cultivated plants, and no one need search for wild wheat before he commences cultivating that most valuable, and now generally diffused cereal, because, in fact, success has given much, if not all the information, for which we are obliged to seek in the case of a new plant.

Culture, moreover, is calculated to favor the secretion of some, and to promote the formation, of other products of plants. As to cite familiar instances, is the case with the carrot and lettuce, neither of which should we take in a wild state as guides to cultivation, unless we wanted to employ them as medicines.

In the case of Cotton, the product is a natural one, but we have only vague information concerning the plant in a wild state, and no proof of the quality of the staple, or the quantity in which it is produced, both of which are most important considerations for the planter who looks for profit.

We shall therefore take the soils of Cotton fields where that staple is already produced, as examples which it is desirable to imitate or to avoid, though not neglecting any information obtainable from the state of the same plantation in a wild state, because these often

CSL

give us hints respecting their power of existing under different circumstances.

Sea Island Cotton is cultivated on a range of islands lying along the coast of South Carolina and of Georgia, from 32° 30′ to 30° north latitude. These islands are described as having been the abode of a tribe of Red Indians, who were fishermen rather than hunters, and that the accumulation of oysters, clams, and other shells, mingled with bones and pottery, is astonishingly great, and these have become ultimately mixed with the sandy soil and decayed vegetables into a peculiar loam of a light and fertile nature.

Upland Georgia Cotton received its name from being cultivated in the interior of that State. From the sea coast to the interior, for a considerable breadth, the country is level, and the soil a sandy loam. Beyond these plains stretch the hilly undulating country, which has a deep black loamy soil.

Professor E. Solly analyzed the soil of four Georgia Cotton farms, obtained by Lord Palmerston from Mr. Consul Molyneux. One plantation was much elevated, the land of a deep chocolate color, and yielding from 1,000 to 1,500 lbs. of seed Cotton to the acre. A second was said to produce the best Cotton in the State of Georgia; a third was situated in a limestone region, "which invariably grows a good product;" a fourth was a specimen of poor land, and the quality of its Cotton is what is called "deficient in staple."

Mr. Solly observes that these were all of a similar nature, their difference being merely in the relative quantity of their constituents, the structure of all was light, porous, and friable, of such a nature as to possess a considerable retentive power for water, and yet from its openness to allow of a sufficient degree of drainage. They consisted mostly of sand, the poorest of little else. They also all contain alumina, oxyde of iron, and manganese, but with hardly any lime. The organic matters consist of either decayed portions of plants, &c., or very finely

CSL

we have carbonate ?) lime (so dont use it.

divided, and soluble matter; these, in the soils, vary from 4 to 8 per cent., and in the sub-soils from 1 and 1½ to 4 per cent., the soils also contain traces of saline matter.

Cotton culture, it is well known, extended from Georgia into South Carolina, west into the hilly country, and into all the Southern States, that is, into the alluvial plains of the Alabama and Mississippi.

The soil here is a rich fertile alluvium of a blackish color, and no doubt containing much organic matter, but we have seen no analysis of it.

The soil in these regions is described by planters, without referring to their chemical analysis, as extending, from the sea coast to 100 miles into the interior, as a level tract, consisting of sand loam, covered with pine, a mixture of sand eight to ten inches deep, with clay and loam. Beyond this plain undulating hills stretch backwards till they unite with the Appalachian Chain. These waving tracts are described as among the pleasantest and finest in the United States, especially on the River Savannah and on its western and north-western branches, where the soil is a deep black loam. Mr. Spalding states that the short-stapled Cotton is of a better quality when raised near the sea, than at a great distance from it, and it thrives most luxuriantly on alluvial soils, a little impregnated with salt, as in some of the districts of Louisiana.

Then the soils, which are deeply tinged with red, and well seasoned with salt, between the waters of the Arkansas and the Red River, give forth the most abundant crops of the best quality of that description of Cotton. But the red soil of the interior of Georgia is said to give a tinge to the wool grown upon it, and that the grey soil produces a finer crop. Mr. Spalding further says that several varieties of the short-stapled Cotton grow well and perfect their fruit all the way from the southern borders of Virginia to the south-western stream of the Mississippi, and in every soil, whether clay, loam, or sand, provided the waters be kept well drained from the surface of the land. Mr. Seabrook considers a light sand to be the best soil for the Sea Island Cotton plant:

CSL

but that for high loose sandy soils, salt mud, green marsh grass or rushes, are now commonly put under the sward, in which the bed is to be made, several weeks or months before seed-time.* For low close lands fresh Cotton seed, pine straw, marsh rushes, or any substance rotted in the cow house may be used, though on the Mississippi the growers of Cotton think that new land does not produce so fine a quality of Cotton as that which has previously borne two crops of grain. Excess of food, Mr. Seabrook observes, produces a large and luxuriant stalk, but renders the fruit scanty.

Dr. Ure, referring to his own results, long since remarked that the chemical analysis of Cotton wool throws considerable light on the predilection of the Cotton plant for the neighborhood of the sea, as this supplies plentifully the saline substances requisite to the perfect development and constitution of its woolly fruit, and that it enables us to infer that the compost or manure best fitted for Cotton plantations should contain neutro-saline matter, with alkaline, calcareous, and magnesian bases, and that the presence of magnesia deserves notice, as it indicates marine food. But with respect to the absence of soda salts from the ashes of Cotton, he observes here, as in many other examples, the vegetative power of the roots seem to eliminate potass from the stone detritus of the soil, which replaces the soda in the sea salts. For otherwise we should have found salts with a basis of soda, instead of potass salts, in the ashes of the Cotton. But as only the Cotton fibre was submitted to examination, it is quite possible that the soda salts, if such are necessary to the plants, might be detected in the stem, branches, or leaves, that is, in the parts of vegetation. The American chemist observes that the ashes of Cotton seed are four-fold that of the fibre, and that the former contains three times as much phosphoric acid as the latter. In respect to the phosphoric acid and the lime, the quantity of both these substances is greater

---

* That is to say salt mud and marsh grass are used as manure for sandy soils.

GSL

in the American analysis than in that of Dr. Ure: whether this may be owing to different kinds of wool having been employed, or to differences in the soils in which they had been grown, can only be known when the analyses have been repeated by chemists with different kinds of Cotton. The subject is well worthy the attention of Mr. Assistant Surgeon Mayer, of the Madras Medical Service, who has made so admirable an analysis of the mineral constituents of the flax plant and of the soils on which the plant had been grown.

Professor E. Solly, as the result of his analysis, remarks that the goodness of the soils from Georgia depended probably far more on the mechanical structure than on the chemical composition, and that the presence of leaves or any other substances would appear of far less importance than that the soil should be not too rich, but of a light porous character, so that the delicate fibres of the roots might penetrate easily in all directions. This opinion is probably not far from the truth, wherever the climate is most suitable to the cultivation of Cotton. Dr. Wight, after practical experience of some years, states that where it is in his power to choose, he prefers a deep, dark-colored, light, almost sandy loam, and if it has been out of cultivation, so much the better. The black Cotton soil in which so much of the Cotton of India is grown, and which is generally considered the best for the purpose, is remarkable for its power of retaining moisture: while of the red soil he says that in some parts of the country, for example, in the Vizagapatam district, the finest Cotton crops, both as to quantity and quality, are raised on red soils, and the redder the better for the purpose, but the suitableness of these several soils must be considered in connection with climate.

In endeavoring to draw a practical inference from the composition of soils, it is first of all necessary to observe, that though no one will dispute the paramount importance of the chemical constituents, yet these may be considered in some respects to be only of comparative value, since it

CSL

is equally necessary to attend to the mechanical state of the soil, and to both in connection with the climate of particular localities. The mechanical state of a soil, its greater or less degree of porosity or of tenacity enabling the roots to spread with more or less facility, so as to fix the plant steadily in the earth, at the same time that they supply it with a large portion of its nutriment, is necessarily of great importance, but as a considerable portion of the food of plants is supplied by the air, its different states and due supply require also to be attended to in addition to climate. No chemical composition or mechanical state will compensate for unsuitableness of climate. We all know that our oaks are as little likely to flourish within the tropics as South American palms in our meadows, and no one expects that our rich variety of orchids would flourish, if supplying them with every requisite of site, of soil, of culture, and even of temperature, we denied them a moist atmosphere. And yet a few years only has elapsed since it was considered a rarity to flower these air plants, and also since mountain rice was attempted to be cultivated here in the open air, because it came from a cool climate, and was said to be cultivated without irrigation, but it was forgotten that during the season of cultivation in its native mountains, rain falls almost every day, and the air is in a state of continual moisture. So also in the culture of Cotton, a certain state of the soil, both with respect to its chemical composition and its mechanical state, may be well suited to one situation and yet not be desirable in another, chiefly from a difference in the condition of the atmosphere. For instance, a certain degree of porosity of the soil may retain and bring just enough of water within reach of the roots, and yet if the atmosphere become more damp, the soil may require to be made dry by drainage : again, if in another situation, the air is more dry and evaporation necessarily greater, both from the surface of the earth and from that of the leaves, a soil more retentive of moisture will be more suitable than one which is more open, and which thus allows moisture to escape, not only by evaporation, but by drainage. These varieties may be observed not only in the soil and climate of different localities, but even in the same locality at different seasons of the year, especially in a country like India, which in the language of meteorologists, has a climate in may parts of great extremes. As plants obtain from the ground their water, holding in solution saline and earthy particles, and are dependent upon the air for the elements of organic matter, it is evidently essential to pay equal attention to both, for it is difficult, nay impossible, in most cases, to say whether the soil or the climate has most influence upon successful cultivation, and it is nearly as useless, to use the words of Mr. J. S. Mill, as "attempting to decide which half of a pair of scissors has most "to do in the act of cutting, or which of the factors, five and six, contri-"bute most to the production of thirty."

Report on the Analysis of Sea Island Cotton and its Soils, by J. Higgins and L. Bickell.

Dated Office of State Chemist, Baltimore,
November 1854.

Any substances added to a soil to increase its products, without a knowledge of the constituents of the substance, the deficiencies of the soil, and the requirements of the crop, must depend for its success on lucky accident and mere guess work: whilst a manure compounded with reference to the wants of the soil, and nature of the crop grown on it, must be successful, because used on rational principles, and as a cause to produce an effect, having a direct connection with, and dependent on it.

The Cotton plant, like every other plant, requires for its perfection certain climatic influences, proper cultivation, and a soil of proper physical texture, containing certain substances which do not, and cannot exist in the atmosphere. All plants derive one part of their nourishment from the air, and another part, their mineral constituents,

MINISTRY OF CULTURE · GOVERNMENT OF INDIA
GSL

ash, &c., from the soil. Lime, magnesia, potass, and soda, with various combinations of chloride, phosphoric, and sulphuric acid, are necessary, absolutely necessary, to the growth of the Cotton plant: without these no Cotton plant has ever existed, and they cannot be obtained from the atmosphere, with the exception of chlorides, and soda under particular circumstances, and therefore they must either exist in the soil, or be supplied by the application of manures, or this plant will not grow. Manures are therefore nothing but substances necessary to the growth of a plant, which are deficient in the soil. If any soil contained all the substances which a plant required, in proper form for its use, there could be no manure for this soil, because there would be no deficiency to supply, and the plant grown on it would reach a degree of perfection limited only by its cultivation and the climate. If on a soil containing all the substances, no manure would act, then on a soil deficient in any one of them, a manure would act only by supplying that deficiency, and should contain nothing but the substance deficient. All others would be useless.

To manure any soil then, as a matter of course, its deficiencies should be ascertained, and the manure made with reference to those deficiencies. Those deficiencies can be ascertained in two ways: the one by a long-continued course of practical experiments: the other by chemical analysis of the soil and plant. The world has depended from its earliest age on the first mode, with what success, the condition of agriculture until the past ten years will best answer. Improvement only reached a certain point, and that a very low one, and then ceased. Farming was as well conducted in Italy sixteen hundred years ago, as in the United States or England twenty years ago. Mere practice then, without the aid of science, failed to lay down a rational manuring system for the growth of wheat or any other crop. * *

The effect which we desire is the production of the Cotton plant in its greatest perfection.

CSL

* * * * * *

What are the substances necessary for the growth of the Cotton plant?

Are all or any of these deficient in the soil? If so, then the manure best adapted to the soil is the one most abounding in the deficiencies of the soil, and such a manure must be recommended by the teachings of science, aided by all the lights of experience.

1*st.*—What are the substances necessary to the growth of the Cotton plant which exist in the soil?

The Cotton plant, like other plants, is composed of two grand classes of organs, one directly, and the other indirectly, tending to the perpetuation of the species: the second is the stalk and leaves, the first is the seed and its appendage, the Cotton fibre or wool. The following table of the analysis of the Cotton fibre and seed shows the composition of each, and the proportionate quantity of the substances which they require:—

COTTON.

General Percentage Components as to

	Fibre	*Seed.*
Water	4·72	9·51
Organic matter	94·03	86·46
Ash, or mineral matter	1·25	4·03
	100·00	100·00

Percentage Composition of the Ash, or Mineral Matter.

	Fibre	*Seed.*
Potass	35·26	34·75
Soda	5·11	1·10
Lime	16·73	6·00
Magnesia	9·47	13·73
Peroxide of iron	2·07	0·55
Silicic acid	0·26	...... trace.
Phosphoric acid	5·24	35·85
Chloride	6·60	0·74
Carbonic acid	15·55	3·59
Sulphuric acid	3·53	3·96
	100·00	100·00

The composition of these two will show what they require, and if their requirements be not allowed, they will fail to grow.

From the above it will be seen that the wants as to mineral matter of the Cotton wool, or fibre, are chiefly potass and lime. If the soil should be deficient in either of these, then potass should be the chief constituent of the manure: this is a self-evident proposition.

Next to this in quantity we have lime: if the soil on which Cotton is planted contains not this in sufficient quantities, then the manure should supply the deficiency: this is also a truism: because we know that neither potass nor lime is furnished to crops, except through the agency of the soil or manures. Soda is also a component of the Cotton fibre to a large extent: but we need not make this a constituent of the manure for this crop, because from the locality where it is grown, near the ocean shore,* a large quantity of soda, in the form of common salt, is supplied to the soil of all these islands in the spray from the sea. Here, then, is a source of supply. The same is true of chlorine, which is here always associated with soda. Phosphoric and sulphuric acids likewise exist in the fibre: all of these are necessary to the full development of the fibre, and without them it cannot exsist: absolutely no fibre could be produced, unless the soil contained not one, nor several, but all these constituents. So much for the Cotton fibre as regards its mineral constituents, but it also requires a mechanical basis for its growth; those are seeds from which the fibre springs: without a healthy seed of strong vital power the fibre will be small in quantity, and inferior in quality. We now, therefore, turn our attention to it, and seek its wants from its analysis.

no Soda
in ma
[illegible]

The analysis of the seed shows it to be much richer in mineral matter than the fibre: the latter containing only 1·25 per cent. of ash, while the former contains 4·03 per cent. In the seed the chief mineral constituent is phosphoric acid: more than one-third of the whole mineral composition of the seed being formed of this: we have next in quantity potass, also composing more than one-third of the whole amount of the mineral matter; next in quantity we have magnesia, then the lime, then sulphuric acid; and as none of these substances can be furnished by the air, if the soil be deficient in them, they must be supplied by manure: they are essential to the growth of the plant, and if not present in the soil in proper quantity, and suitable form for assimilation, the plant without manure will languish and die.

---

* This paper refers especially to Edisto Island.

We thus are told by the fibre and seed, in the plainest language, what they need for their full development: the Cotton plant seeks this kind of food from the soil. Can the soil respond to its wants? Is it capable of furnishing all of the constituents shown in the above analysis in proper quantity and in proper form to supply all that the plant needs? If the soil can do this, then no manure is necessary. We will submit the soil to the same scrutiny as that to which the fibre and the seed have been submitted. We will add to this information, derived from practical experience in manuring the soil, a thing never to be despised, and we will see in these two modes, each confirming and strenthening the testimony of the other, what should be the composition of the manure best adapted to the crop, and at the same time the wants and deficiencies of the soil upon which it grows.

The soil upon which the above-mentioned Cotton was raised is composed, as to its bulk, of nine-tenths of fine alluvial sand, and of one-tenth of a cement consisting of sand, peroxide of iron, clay, lime, magnesia, and humus. It is not alone the very small proportional quantity of cement to that of sand in which this soil differs from ordinary productive soil, known as clayey loams, and which renders it a very light one, of little tenacity, or of retaining powers for water and nourishment in general; but this condition is also due to the nature of the cement itself, which does not show a normal quantitative proportion of its constituents. These constituents ought to be united

GSL

to each other in such a proportion as that none of them can exercise predominant influence. Sand, lime, and magnesia, on one side, have to temper the tenacity, and binding of the clay, iron, and humus, and by these means permit the free influence of the air upon the soil, and the rain-water to penetrate it intimately without resting upon it. Clay, iron, and humus, on the other side, have to exercise their binding and water-reserving powers, but only to such an extent as will retain the solution of nourishing substances, without doing injury to the porosity of the soil or its communication with atmospheric ingredients.

An examination of the soil in question shows no such proportion of its constituents. It is almost entirely composed of sand and oxide of iron, next to these of clay, then of magnesia and humus, and only of such small quantities of lime as is quite common in soils. It is most probably to this fact that the larger percentage of magnesia must be attributed which we meet in the composition of the ash of the Cotton fibre and especially in that of the seed raised upon the soil. The want of lime induced the Cotton planter to appropriate more abundantly magnesia, a substance, which, in its chemical character and properties, stands nearest to lime, and which, therefore, is capable of substituting it to some extent. It is, however, beyond doubt, that a substitution of lime by magnesia, induced by circumstances of necessity, as they may have occurred here, will rather act injuriously on the quality of the fibre than improve it, and that therefore the planter's principal endeavor must be directed to the formation of a more calcareous cement, as well as it regards the mechanical texture of the soil as its directly nourishing properties. The improvement in the mechanical texture of this soil will best be effected by the application of a clayey marl, a substance composed of clay and lime, of which the former will increase the slight tenacity and water-holding powers of the soil, while the latter will supply the present deficiency of lime. If marl cannot be procured, it may best be substituted by any kind of sand mixed with common shell-lime, which should be applied to the soil on the surface, and suffered to remain there as long as possible. This will act on the soil in the double capacity of improving its texture and affording lime as a nutriment.

As to the directly nourishing properties of the soil, the analysis shows 1 acre 1 foot deep, weighing 3,000 tons, to contain of phosphoric acid less than 15 lbs., sulphuric acid less than is contained in a bushel of plaster of Paris; cholrine, more than is contained in 4 bushels of common salt; potass less than 20 lbs., a quantity so small, that it could not accurately be ascertained; soda, more than contained in 4 bushels of common salt.

We here therefore meet with

A deficiency of phosphoric acid,
A deficiency of sulphuric acid,
A deficiency of potass.

And, on the other side, with

An abundance of chlorine,
An abundance of soda.

As to the soda, it stands nearest in its chemical character to potass, and though it is itself not a nourishment for plants, to any great extent, as the quantity of it decreases in plants in proportion to their cultivation, it nevertheless acts as a substitute for potass in the same manner as magnesia for lime. The composition of the Cotton staple, as given above, shows the presence of soda in its ash in no small quantity. This circumstance seems to express, in accordance with the analysis of the soil, that by the scarcity of the potass the plants were forced to assimilate soda. In this condition of things, the Cotton plant could not be produced in its most perfect form.

If we now consider attentively, first, the requirements of the Cotton seed and fibre; secondly, the capacity of the soil to meet these requirements:

we shall find the chief deficiencies to be these: first, a deficiency of lime in the soil; secondly, a deficiency of potass; thirdly, a deficiency of phosphoric and sulphuric acid.

The best manure for the Cotton plant is cowpen manure and Cotton seed, rich in phosphoric acid and potass.

* * * * * *

But these are not always obtainable in sufficient quantity, so that we must have recourse to a supply of manure not directly the product of the soil itself. This manure, of course, should especially contain both phosphoric acid and potass: practice adds the suggestion that some nitrogenous manure is always useful in stimulating the first growth of the plants. Peruvian guano may supply the nitrogenous element, bone dust the phosphoric acid, and certain refuse of manufactures the potass. Sulphuric acid is best supplied by plaster of Paris, which need not be used if the bones be dissolved in sulphuric acid, and thus used as a constituent of the manure.

Whatever may be the productive capacity of a Cotton soil in its virgin state, it deteriorates by long cultivation.

The following table shows the substances and their quantity used in a crop respectively by the fibre and seed :—

COTTON.

Production per acre.

Fibre	200 lbs.
Seed	600 ,,

	General Composition in lbs.	
	of 200 *lbs. fibre.*	*of* 600 *lbs. seed.*
Water	9·40	57·06
Organic matter	188·06	518·76
Ash or mineral matter	2·50	24·18
	200·00	600·00

Composition of the above Ash as taken away by a single crop from one acre.

	Fibre.	*Seed.*	*In all.*
Potass	0·881	8·403	9·284
Soda	·128	·266	·394
Lime	·418	1·451	1·869
Magnesia	·237	3·320	3·557
Peroxide of iron	·051	·132	·183
Silicic acid	·007	...... trace	·007
Phosphoric acid	·136	8·669	8·805
Sulphuric acid	·088	·958	1·046
Chloride	·166	·113	·279
Carbonic acid	·388	·868	1·256
	2·500	24·180	26·680

This table shows, that in order to maintain a soil in its original excellence, manures must be added, having the composition of the Cotton cultivated: and they must, for practical utility, not only contain all the constituents of the Cotton ash, but have an excess to provide against loss from all sources which tend to the depreciation of manures.

Section II.

THE PLANT, ITS VARIETIES AND CULTURE.

In August 1841, Dr. J. V. Thompson, of Sidney, addressed Lord Auckland on the subject of the kinds of Cotton which he thought best suited for successful cultivation in India. The following are passages from his letter:—

From the observations I have been enabled to make in the course of my service in various colonies, and having had this present season upwards of thirty varieties of Cotton under culture in a very small way, I have discovered what, by a wrong choice, might involve the planter in difficulties, and might lead to disappointment in a native of India, as it might give him a distaste for any future experiment.

The cultivated varieties of Cotton may, I find, be divided into two classes, *viz.*, early and late kinds, this precocity or tardiness being inherent in the particular varieties, and derived from a peculiarity hitherto unnoticed, and which it will not be difficult to explain. It may be observed that all the varieties have a natural tendency to produce a central main stem, furnished with a leaf at intervals of a few inches: in the axilla of each leaf-stalk reside a pair of germs or buds placed in the same plane, or side by side: one of these germs is destined to produce flowers only, the other only branches. In the early kinds, the former, or flowering branches, alone are developed, while the late kinds expend their force exclusively in the production of multiplying branches. This peculiarity must for ever unfit these late kinds for a cold climate such as Northern India, North America, Europe, or the settled parts of Australia: as just when the plants begin to devolop their secondary or flowering branches, which they do first towards the summits of the main stem, and multiplying branches, the cold weather comes to check them, so that they rarely ripen a

CSL

single pod: and if the temperature falls much below 70° Farenheit, the greater number of these varieties are killed down to the very ground, or entirely destroyed. Should the climate prove sufficiently mild, or the plant so hardy as to withstand the effect of the cold season, it may be expected that these late kinds would, by the advances they have made already, yield an early crop of Cotton the second season. When these kinds are planted in a hot climate, to which alone they appear to be adapted, they may yield a comparatively small crop within the first twelve months: it is very important therefore, to become acquainted with those late kinds, and to avoid the cultivation of them altogether, whenever it is the object of the planter to secure a good and certain crop within the first year. The kinds I have discovered as belonging to this class are :—

1. The kidney-seeded or Brazilian Cotton.
2. The vine-leafed Cotton of St. Helena.
3. The maple-leafed Cottons, *viz.*, the Seychelles and the Mangrole.
4. The Dacca, and the other varieties of Dr. Roxburgh's *gossypium herbaceum.*
5. Some varieties of Bourbon.

The kinds of the class which my knowledge and experience point out as the best, and least likely to disappoint the Government, are :—

1. The ordinary Sea Island : the seed is sold in America at the rate of a dollar for 40 bushels.
2. Select Sea Island.
3. Extra fine in small quantities.
4. Ordinary Bourbon, and fine Bourbon (but not the Bourbon now known in India, which Dr. Roxburgh says is the *gossypiun Barbadense*).
5. West Indian, including Demerara.
6. Egyptian, Maho, and other early varieties of Egyptian.

To these may probably be added some of the varieties of Birmese and Siamese Cottons reported to have been brought by Dr. Wallich from the coast of Martaban to the India House, and as cultivated also in the interior according to Colonel Symes and Major Burney, and which, from the facts they have communicated, may be inferred to be an early kind, with a fine long staple easily separated from the seed.

Under this conviction, I would beg leave respectfully to urge your Lordship most strongly to take measures to procure a very ample stock against next season of Birmese Cotton seed (enough to freight a vessel), from Chagaing or Lettshoung-yoo, near Ava, the chief emporium of Cotton on the Irrawaddi, as it is to be had in unlimited quantity at a very trifling cost. At the same time I would recommend some seed to be procured of a foreign variety of Cotton cultivated to some extent, according to Major Burney, by the inhabitants of Taroop Myo, a place on the Irrawaddi, a little below Yandaboo. This Cotton is designated by the natives Thembanwa, or ship Cotton: it is to be observed, however, that they call the Pernambuco Cotton by the same name, of which they appear to have only a few plants; but the seed of the Pernambuco are very easily distinguished by their adhering together in groups, or, more precisely, in conical masses of from seven to nine seeds. * * *

The point next in importance to the choice of the kind of Cotton, is climate: for as all the varieties are natives of warm climates, even the hardiest of them can only be got to grow so as to produce a remunerating crop, within a belt limited to the 40° of northern and the 30° of southern latitude: these appear to be about the extreme limits at the level of the sea elevation, as it lowers the temperature according to known laws, will, of course, reduce these limits considerably in a mountainous country, and render necessary that this should be determined with some degree of accuracy, before engaging in a culture that might prove abortive, from the temperature proving to be below the required standard.

CSL

As a general rule may be stated :—

1*st.*—That none but the early kinds can be successfully cultivated in extra-tropical countries, or at elevations at which the temperature does not permit a continuous vegetation of nine months, or, in other words, where the temperature is not steady at or above 70° Farenheit during the above period.

2*nd.*—In tropical countries every variety of the Cotton may be cultivated, except at great elevations, and may be advantageously made a perennial crop.

The next point to be considered in cultivating Cotton, is the soil, and my experience enables me to say that the greater number of the varieties can be cultivated in soils too poor and scanty to produce a crop of almost any other kind: as with the exception of meagre dry land, stiff clay, or boggy ground, it adapts itself to every description of soil. I have seen it luxuriating in almost pure sand, and amongst the almost bare volcanic rocks and stones of the Mauritius.

Should the prejudices of the natives cause them to reject the cultivation of a plant with a new face, and so different from what they have been accustomed to, it has appeared to me that this difficulty may be obviated (should it present itself) by crossing the native varieties with Cotton possessed of greater productiveness, longer staple, and easier separation of seed, as I think that I have discovered in my experiment, conducted with this view, that the plant receiving impregnation affords a progeny still partaking more of the appearance of the mother, while the principal change is effected in the pod, seed, and Cotton. Having experimented in crossing to a very great extent this season, I could have sent your Lordship some of the resulting seed, but, sensible that it is now too late for India, I shall sow it in a few weeks' time, and communicate the result in a future paper. As illustrative of what is above stated on this subject, I have sent a sample of a much improved cross of Georgia with Maltese brown, which I designate Georgiatina, and forms a Nankeen Cotton, which

CSL

separates more easily from the seed than Georgia, and is converted into a long-stapled wool of superior quality, while the plant is, to all appearance, unchanged. To show that the tint is not inherent, but capable of being discharged by bleaching, I have enclosed a small sample so treated, which has become beautifully white, without being injured in staple.

I have also sent some samples of a new Cotton of very superior quality, but mostly tinted, together with small bleached samples of the same, to show that these tints are readily discharged, but with danger to the strength of the staple, if not cautiously conducted, as these samples exemplify.

* * * * * *

I was conducted to this mode (artificial crossing) of obtaining improved Cottons, by observing the facility, or rather aptitude, with which the Bourbon Cotton received impregnation without artificial assistance: as, having been introduced by Mr. Mayo, with many other kinds, about seven or eight years ago, it has now run into as many distinct varieties as it has been years in the Colony.

My plan, systematically conducted during the past season, has been to sow an open drill of the superior kind, with 5 feet from plant to plant, and a drill on each side of the plant to be improved.

As these came into flower, I daily went along the two outer drills, cutting away the stamina with a pair of surgeon's crooked scissors, observing to hold the open flower steadily with the left hand, and using the scissors with the elbow or bend outwards; in this way it is easy to see clearly into the flower and to avoid injuring the stigmas. In most Cottons the stamina stand out from the central column so freely that it is very easy to cut them away: in the East Indian Cotton it is more difficult, from the stamina being so short and close set. In these, however, and in the Sea Island Cotton, they are arranged in five longitudinal rows, and may generally be entirely removed by five distinct clippings; if any still remain, they must be taken away by the point of the scissors. In all the

CSL

kinds, except the Indian, the stamina requires to be blown out of the flower from its erect position : but in the Indian all that is requisite is to let the flower drop into its original pendent position, and tap it gently with the fingers.

As the pollen of all the malvaceous plants is globular and hairy, and apt to adhere to the stigma, it is better finally to brush it off the denuded stigma with a full-sized camel-hair pencil. When all the flowers intended to be impregnated are thus prepared, the next operation is to load a dry, full-sized camel-hair pencil with the pollen from some of the flowers of the central drill, and to apply it in succession to the denuded stigmas, so as to charge them with an abundant coat, occasionally replenishing the brush from fresh flowers. When one kind only is under experiment, all that is necessary in addition, is to cut away all flowers that have not received impregnation : but as my operations have been on a very extensive scale, I find it necessary to mark every impregnated flower by tying a small piece of colored worsted round the peduncle or flower stalk.

Dr. J. V. Thompson, in June 1841, addressed a letter to the Secretary of the Agricultural and Horticultural Society.

I beg to send the Society a packet of seeds of the Mangrole Cotton, and a sample of the wool. * * * It appears to be of a variety admirably suited to cultivation in India. * * * Dr. Ure alludes to it thus:—"There is a village near Mangrole, in Kattywar, "which produces a small quantity of very fine Cotton. It is cultivated "by the natives, and grows only on one particular spot of small extent "near the sea-coast." * * * It is one of those varieties which may be classed as late Cottons, producing few blossoms the first season, and those so late as to be rendered abortive by the setting in of the cold weather (at Sidney).

CSL

Instructions for the Cultivation of Foreign Cotton in India,

by W. R. Mercer, *Planter.*

The best time for sowing Cotton seed is after the heavy rains of the south-west monsoon are passed, as much water is likely to injure the freshly sown seed, as well as the young plants.

The ground should be prepared by being well broken up with the plough, and cast into ridges eight or ten inches high, and 6 or 7 feet apart. After the ground has been prepared in this way, if it be allowed to settle for a few days previous to sowing, the young plant are likely to take root more vigorously than if they sprung up in the freshly ploughed and loose earth.

In planting, one hand, with a hoe, should make on the top of the ridge holes about an inch and a half in depth, and sixteen or eighteen inches apart; another should follow and drop into each hole five or six seeds, and a third coming after should cover them lightly, taking care to leave the ground perfectly smooth.

When the plants are up, and begin to put forth the third leaf, they should be thinned to two stalks. In doing this the hoe should be used to scrape away from the remaining plants any grass or weeds that may have sprung up in the meantime. In a week or ten days they will mature enough to require thinning again, when they should be reduced to one stalk, and the hoe used as before to remove any interlopers. At this stage the plough should be used, and a light furrow turned with it towards the Cotton, taking care not to turn it so close as to cover any of the little plants. The hoe should follow the plough and draw the mould round the roots, sufficient to replace what had been removed by the previous scrapings: but not any more.

When this is done, the spaces between the rows should be ploughed afresh to destroy the grass, and this operation should be repeated as often as they become foul, still using the hoe to keep the spaces between the plants on the ridge clean: the hoe should be so used as to scrape, not to dig or chop. It is the most essential feature in this cultivation to keep the ground free from all extraneous vegetation while the plants are growing.

Topping is important only when the plant is disposed to produce wood and leaves to the detriment of the flower and pod. When this is the case, to take off an inch or two of the top, after it has commenced podding, say about the beginning of the fourth month after planting, will materially assist that operation.

The Cotton should be gathered or picked as the pods burst, not leaving it exposed to dews or sun; if it be dried under cover, it will advantage its glossiness of appearance. The picker should be provided with a bag about the size of a pillow slip, suspended to his side by a strap across his shoulder, in which to thrust the Cotton as he picks it, taking care to keep it free from trashy leaves and dirt of every kind; he should grasp the Cotton with his thumb and three fore-fingers, and avoid, as much as possible, drawing away any of the pod, or outer leafy covering.

Sea Island Cotton is always cleaned in America by the roller gin: the saw gin is never used.

Dr. Wight, of Coimbatore, at various times communicated to the Agricultural Society the results of his experience in the management of exotic Cotton in India: the following are extracts from his paper:—

In July 1843 he sent 2,100 lbs. of foreign seed, 300 lbs. of which were of the Bourbon kind; he writes thus:—

This seed I believe to be of the very best quality, having all been raised from seed carefully picked in the first instance, and every bad plant afterwards thinned out when growing: the Cotton obtained from it was of the first quality, and I hope, when grown in Bengal, that it will not disappoint. The plant is exceedingly hardy, bears in

CSL

all weathers, and is so easily satisfied in regard to soil, that in this district it is usually cultivated on lands that will produce nothing else, being no better than a heap of quartz and granite stones, mixed with a small quantity of red earth, the produce of their decomposition. In wet soils it runs too much to stalk, unless it has a long series of dry weather while ripening, its crop will lead to disappointment: on light dry soils it succeeds well, and gives fair crops.

In August 1847 he writes:—

Facts communicated by the Manchester Commercial Association,* combined with knowledge acquired here of the habits of the plant, have induced me to endeavor to ascertain some general rule, applicable to all localities for determining the time for sowing American Cotton in India.

Circumstances which were, by their consequences, deeply impressed on my memory, occurred at an early stage of our proceedings here, and have hitherto served as a guide to our subsequent operations, but empirically and not on any ascertained fixed principle. From the information then and since obtained from all quarters, I have recently deduced a theory applicable to all stations, which, being based on the known habits of the plant, must be correct. I am quite prepared for being laughed at for introducing my formula, with all the seriousness of a real discovery, considering that it is neither more nor less than a self-evident truism: but still it is one which I do not think has been kept sufficiently in view in the management of these Cotton experiments, and the want of attention to its bearing on them, has, I suspect, led to the belief that in India American Cotton is a less certain crop than it really is, when the principle about to be stated is kept duly in view.

---

* Giving an account of the season at which Cotton is sown, &c., in Mexico, the seed from which country is here spoken of.

I find that in the climate of Coimbatore, the Mexican, or, as it is now generally called, the New Orleans Cotton plant, requires in average seasons, from the time of sowing until the expansion of its first blossoms, from six to eight weeks, and from the fall of the flower to the bursting of the mature capsule, about as much more. The first of these periods may vary, though not materially, according to the soil, the situation as regards exposure to high winds, the quantity of rain, &c., and it may be delayed or advanced a little by agricultural treatment.

From fourteen to sixteen weeks may therefore be assumed as the period that intervenes between the sowing and the first pickings of the crop. At the end of that time, the weather, during the interval, having been seasonable, and the monsoon of average quantity, so as properly to soak the ground, the plant should be in full vigor, nearly full-grown, and loaded with crop in all stages, from the embryo form to the open boll ready to pick.

This is the critical period of the crop: should rain cease and be followed by bright clear weather, the full-grown boll will rapidly open and fresh ones continue to advance, for two, three, or if the plants have been refreshed by an occasional shower, even four or five months, and in the end, on good land, yield probably as much as a thousand lbs. per acre. But if, on the other hand, the rains are protracted for a week or two longer, the plants being overcharged with watery juices, the more advanced bolls, constituting the finest portion of the crop, do not open: the Cotton absorbs moisture from the capsule, which, having no means of escape, rapidly rots, or otherwise deteriorates its quality.

From this history of a Cotton crop from the seed to the ripe boll, it will be seen that we must endeavor so to arrange our sowings as to allow a growing season of from twelve to fourteen weeks to intervene between the date of sowing and expected conclusion of monsoon. The sooner our pickings commence after the rains have ceased, the better will be our crops.

Guided by the facts on which the principle rests, and knowing that the north-east monsoon in these western districts is usually of short duration, I consider July the most favorable month for sowing ; August would probably be preferable, if we could equally depend on having rain, (an expectation which four years' experience does not justify,) as in that case we could almost make sure of escaping the destructive effects of a late or excessive north-eastern monsoon.

This season two fields were sown on the 1st of June : two more on the 15th, and about the 25th of that month the regular sowings commenced and continued until nearly the end of July. One farm, situated more in the direct line of the south-west monsoon, had much more rain than the others, which delayed the work, so that it was not finished until the 10th of August, thus affording us a continuous series of sowings, extending over two consecutive months to compare with each other as to final result. One low-lying field was still reserved to a later date, as wet lands are unfavorable to the cultivation of Cotton, by producing effects similar in kind to those arising from unseasonable rains on dry ones. In a word, I have never found Cotton succeed well on what is technically called a "wet bottom" : the plant grows well, but the crops always fall short, and much of the staple is damaged.

The fields sown on the 1st and 15th of June are now far advanced, the former in full flower, and many grown bolls to be met with, which should be ripe about the end of September, in which case the bulk of the crop will be coming on in October, about the time of our heaviest rains : and if they are in average quantity, I anticipate the greater part will be lost.

In applying this rule to other portions of India, it may, I think, be laid down as a rule that all along the eastern coast of the peninsula, the last week in August and all September will be found favorable for sowing : the north-east monsoon being much more abundant and of longer duration there than in the interior : and in countries subject to the south-west monsoon, the last week in May and all June will

CSL

probably be found the most suitable seasons: the exact time being determined by the individual season and the average duration of the rains at each station.

Cases will, of course, often happen where, owing to favorable rains occurring at a season which may be considered a little too early to be quite safe, the cultivator may be perplexed, not wishing to lose a favorable opportunity, which might be withheld at the proper time. In such cases the safer plan is to advance, as the plant is one possessed of great powers of resisting heat and drought, should they follow, and is ever ready to take advantage of the first rains that fall: if, on the contrary, the weather continues moist, and there is danger of the plant advancing too rapidly, its progress may be, to a considerable extent, retarded, by delaying to hoe and loosen the soil about its roots, which certainly produces that effect. If, on the contrary, the sowing is unavoidably delayed, the loss of time can be subsequently compensated by early and repeated hoeings.

The course adopted here is to hoe and thin out to about twice what will be required, as soon as the first or second proper leaves (between the seed lobes) begin to show themselves, that is, in about ten days or a fortnight after the plant is above ground: in about a fortnight or three weeks after, the plant being then four or five inches high, the ground between the rows is loosened by being ploughed with the native plough; and, lastly, in two or three weeks more they get a second heavy and final thinning: from which time little is required, except in fields overrun with weeds and grass, in which case these operations require to be repeated.

In March 1848 Dr. Wight drew up a memorandum on the naturalization of Mexican or New Orleans Cotton in India. He writes thus :—

A subject of much importance in connection with the successful naturalization of the Mexican Cotton plant in India, namely, the proper sowing season, has in discussion led to the promulgation of three distinct sets of opinions, more or less differing from each other: two of these being easily submitted to the test of experiment, claim being subjected to that ordeal on a widely extended scale, the more so, as the results obtained in the course of their investigation must almost unavoidably decide the correctness or otherwise of the third.

The experiment (at Coimbatore) was commenced under the guidance of professional American Cotton planters from the State of Mississippi, an extra-tropical province, lying between the 30° and 35° north latitude. These persons, on their arrival in India, were very naturally struck with the great difference of temperature existing between India and the region in which they had hitherto cultivated the Mexican Cotton plant, and perhaps from previous success in the colder country, believing it to be a native of the high and cool table-land of Mexico, at once concluded that the Indian climate was too hot for its successful cultivation, except, and even then but imperfectly, during the cooler season of the year. This opinion, which many circumstances that have occurred in the course of the experiment, have tended more or less to invalidate, they all still retain. No later than July last Mr. Mercer stated to the Manchester Commercial Association his belief that the growth of Cotton in India, from New Orleans seed, must necessarily be limited, as it could only be grown in peculiar climates. That in the district of Dharwar he had found such a climate, and succeeded, but that that was owing to the region of Dharwar having a mild climate: that in some portions of Candeish and Coimbatore, having similarly mild climates, it equally succeeded in both places, but he concluded, that as the extent of country so favored was, upon the whole, limited, Great Britain could only expect to derive a small portion of her Cotton of this description from India.

About the time he was making these statements, I was engaged in drafting a letter to the Secretary of the Agricultural Society of India,

CSL

which was read at the September Meeting, and after published in the newspaper. In that letter I stated in effect that it appeared to me that what we had principally to attend to in the cultivation of the Mexican Cotton plant in India, was not so much the heat of the seasons as the adaptation of the sowings to the monsoon, so as to secure for the plant, during the rains, a growing season of twelve to sixteen weeks immediately preceding a period of bright sunshine, which usually succeeds on their discontinuance, for harvesting the crop, which would then be attaining maturity. According to these views, the preliminary showers in May and the latter end of September, which respectively usher in the south-east and north-west monsoons in regions under their influence, were indicated as the proper sowing seasons.

Since then I have been in correspondence with Mr. J. Lees of Manchester, a Member of the Commercial Association of that city, who has examined the subject in all its bearings with the most elaborate care and attention.

His great object was to establish the fact that the plant is truly of tropical origin, by showing that it is a native of the *Tierras calientes*, or hot districts of Mexico, lying under nearly the same parallel of latitude as the Indian peninsula, and in many respects corresponding in climate. Secondly, that in its native country, where it naturally sows itself, it begins to vegetate with the rains in May, and produces its crops in September, and that the Cotton so grown in these hot districts is considered better than that grown from Mexican seed in the United States, however carefully cultivated. And, lastly, he examined the practical result obtained in this and other countries, where its cultivation has been attempted.

The conclusions at which he arrives from this extended examination are, that the American planters have taken an erroneous view of the constitution and habits of the plant in supposing that it requires so cool or mild a climate as they say it does, and that the views I promulgated

CSL

are correct only in so far as they relate to the countries under the influence of the south-west monsoon, but are erroneous as applied to those under the north-east, because the natural growing season of the plant being during the summer months (May, June, July), he affirms that we ought, in bringing it to India, enjoying seasons similar to those of its native country, to conform to its native habits, by sowing it in May, secure for it in India as in Mexico its natural growing season, and urges that it is only in following such a course we need hope for success. In a word, he insists that the proper season for sowing Mexican Cotton in India, is at the same time that our ryots sow their spring crops, which he enforces by adducing the fact, that in Egypt, where both crops are cultivated by irrigation, the Egyptian wheel can raise enough water to irrigate three acres of Cotton, but only one of *cholum*, hence deducing the inference that Cotton requires less water than *cholum* to perfect its crop, and consequently that the amount of rain that in India is found sufficient for the latter (which rarely fails) ought to suffice for the former.

By sowing at the natural time, he observes there would not only be more certainty of the crop, but other most important results would be obtained. The crop would at all times be much greater, and the staple of the Cotton much superior. These results would follow a more perfect development of the plant. The observance of the natural sowing time will produce the most perfect development of which the plant is susceptible. It will then be sown at that period of the growing season when the soil and the climate are in the most heated state, and when this heat combines with those gentle showers which at that time occur, to promote to the utmost the rapidity and vigor of the germination of the seed, and when also, after germination has taken place, the subsequent growing season will be more prolonged and propitious than at any subsequent period of the year.

Without, in the present state of our knowledge, venturing to go so far as to subscribe to those views to their full extent, I believe I am perfectly justified in urging, as the least we can do in return for the pains bestowed by the writer of these very able and elaborate letters, —of which I have only been able to give a brief summary, furnishing a very imperfect idea of the conclusiveness, as a whole, of the arguments adduced,—is to institute over a wide range of country numerous comparative experiments. This, I conceive, may be done without trouble or expense, all that is required being to ask a few ryots in each district, when sowing their *cholum*, to sow a few handfuls of Mexican Cotton seed in any convenient spot in the same field. and to watch the result: in this way the correctness or otherwise of the statement regarding the relative quantities of moisture required for perfecting the crops of Cotton and of *cholum* will be established on a wide and satisfactory basis, and if found correct, may be found the means of at once introducing the culture of the exotic Cotton into many parts of the country where it has not yet been heard of. But whether those first trials fail or succeed in districts under the influence of the north-east monsoon, the experiment should be repeated in October, for the purpose of ascertaining whether it is as certain and productive during the wet as the cool season, keeping the double object in view of confirming or refuting the opinions of the American planters regarding the necessity of a mild climate for its successful culture.

In confirmation of Mr. Lees' views, it seems but fair to state that a large proportion of our crops have usually been gathered during the hottest months, March and April; that at these times the exotic seemed to bear the heat better than the native plant, and that as regards the present season, the only fields which have as yet made a satisfactory return were sown in May, or the very beginning of June. The crops of all those sown after the middle of June, though equally promising on the 10th October, when the unusually abundant and protracted

CSL

rains of this season commenced, has been nearly ruined. The plants, however, apparently true to their natural habits of bearing during bright warm weather, have latterly greatly recovered their health, and are again in full bloom, promising, as usual, a respectable crop (the season continuing clear and dry) in March and April. Samples of May-sown Cotton, picked during the warm weather in September, have, moreover, been pronounced in England the best yet grown in India, another important fact in support of the same view.

In April 1849 Dr. Wight again writes :—

The replies to my circular (that above quoted) have not been so numerous as I expected, but still the information thence attained, added to that derived from my own previous experience, and much drawn from our recent experiments, and from other sources, is, I believe, sufficient to suggest some general rules for our future guidance, of easy application to practice, and such as I trust will be found to ensure as certain and uniform success in growing American Cotton, as now attends the cultivation of the indigenous plant, with the advantage of producing a raw material, yielding about 8 per cent. more of marketable clean Cotton, and this worth, *in the English market*, at least 20 per cent. higher price. * * * * It has been confidently asserted by Mr. Mercer, that the supply of Indian-grown American Cotton must necessarily be limited, as it could only be grown in certain localities favored by having a very mild (cool) climate. * * And therefore he considers the plains of India generally unfit for its production, as being generally much too hot for the culture of that species of Cotton. From the first, taught by much previous observation, I was led to question the soundness of this doctrine. I am now, I rejoice to say, in a position not merely to prove it erroneous, but to show that we have more to fear from deficiency, than from excess of heat, or, in other words, that the climate of the Carnatic during the cold months, our Cotton-growing season, is actually colder than the summer of the Mississippi, their Cotton-growing season. They cultivate from April to September, we from September to April.*

It is not excessive heat which stands in our way (our crops being matured under a mean temperature, lower by several degrees than are those of America), but our having to contend with a diminishing, instead of a rising temperature during the growing season.

Mr. Finnie, another American planter, now in the service, has started a new difficulty. He asserts that the climate is much too dry, and that we need not expect to succeed in the culture of American Cotton, unless in such places as partake of the rains of both monsoons. This opinion, I am now also enabled to prove erroneous, on nearly equally conclusive data : last year, and again this season, my sowings commenced before the south-west monsoon set in, namely, in April and May. The monsoon followed in June and July : my harvest was in active progress in October, when the northern rains commenced : all the crops still on the ground and nearly ready to open, amounting to much the larger portion, was injured or altogether lost : while fields sown between the 28th of July and the 10th August, which came into pick in November, after the rains, yielded good crops.

As compared with Florida, a Cotton-growing country, Madras is very humid, as is seen by meteorological registers.

* * Neither excessive heat nor drought has to be contended against in naturalizing the American Cotton plant in India (at least in Coimbatore), but a diminishing instead of a rising temperature during the growing season.

* * * * * *

The course which suggest itself to me is simple, and will, I believe, be found effective. We learn from the meteorological tables of Madras, that the mean temperature there, at the beginining of September, is 84°,

---

* A meteorological table is here appended as evidence of the truth of the statement—Vera Cruz, Mobile, Natchez, are the places referred to.

CSL

and that at the end of October it is still as high as 81°. If the sowing is effected between the middle of August and the middle of September, the plant will be well grown, and sufficiently strong to bear the cold weather of November and December, while there is reason to believe the cold of these months will only so far retard the maturation of the crop as to prevent its coming to perfect maturity before the middle of January, when, though the nights are cold, causing a low mean temperature, the days are bright, warm, and dry, well suited to commencing the harvest, which will last three or four months.

By following this course as closely as the seasons will permit, it is my belief that there is scarcely a field on which water does not lodge so as to become flood after every fall of rain, in any part of the Carnatic, watered by the north-west monsoon, on which, with due attention to agricultural management, Mexican Cotton may not be as successfully grown as the indigenous now is. Soils as well as seasons vary: some will be found more, some less productive, and a few where the plant will not thrive under any treatment; but such cases do not invalidate the correctness of the general principle as regards the fitness of our climate for its culture.

With regard to other parts of India, I have not had any satisfactory registers of rain; and these suggestions are to be understood as hints for others to work upon. * * * In America they can follow in their cultivation the natural course of the seasons: having a mild, warm spring for sowing, the warmer and showery summer for their growing season, and a clear dry autumn for harvesting the crop. Here the case is different, the spring months of Southern India are dry and parched with intense heat, the summer ones cooled and refreshed with occasional showers, and the autumn ones deluged with rain and quite unfit for harvest operations. To adapt the American Cotton plant to this course of the seasons is indispensable to success: two methods suggest themselves.

1. That of employing the early weeks of autumn as our spring, the latter ones and part of winter as our summer, and the conclusion of winter and part of spring, as our autumn.

2. Or to render ourselves comparatively independent of the seasons, by having, as in Egypt, recourse to irrigation, and thereby securing the growing plant a rising in place of a falling range of temperature, by sowing in October or November, according to the season.

* * * I succeeded in obtaining a small piece of ground, about an acre, with a well attached : it was sown at the end of January, and on the 4th February the young plants began to show themselves ; on the 10th March many of them were upwards of a foot high, all healthy, and showing abundance of "forms," or coming flowers, and that with the thermometer (in the shade) above 90°, and once or twice at 96°, proving that a high temperature, if there is sufficient moisture in the soil, is not injurious to the Mexican Cotton.

The experiment will, I expect, be only partially successful, as we may, in the ordinary course of the seasons, expect cloudy weather and rains in May, which is adverse to the perfect maturation of the crop, but already it goes far to establish the principle for which it was undertaken, and had the sowing been in October, when our rain ceased, would have proved most successful, as it would, in that case, have been now in full crop. * * *

Captain Lawford had engaged in a similar experiment. * * * He sowed the seed in October, there was scarcely any rain, but he had a splendid crop (on good soil), the plants 4 feet high, and the pods very large. * * *

I would suggest that the water be rather sparingly supplied ; little or none should be given from the time picking commences, or rather perhaps for some time before, as the plant, when grown in a rich, moist soil, is apt to become too luxuriant, in which case the produce is not properly ripened. If in active and luxuriant

CSL

growth, when the crop is ripening, the pod does not open at the proper time. * * *

In conclusion, I shall say a few words on some practical details which demand attention.

The first of these relates to the choice of a soil. The best crops I have yet seen have been obtained from dark-brown, very light, sandy loams, mixed with much kunkur, a kind of soil easily worked, permeable to water, and easily penetrated to a great depth by the roots. Red soils having a great admixture of sand, securing them the above properties, also answer well, and are easily cultivated. The stiffer clayey soils have not answered so well, except in seasons when we have had frequent showers, keeping them in an easily workable state, as they are liable to bake, and become exceedingly hard in dry weather.

The black Cotton soils were a good deal tried at first, and I now think rather prematurely condemned as unsuitable for the American plant. Subsequent reconsideration has led me to some extent to doubt the justice of the verdict, and I should like to be in a favorable position to test the correctness of the conclusion with our additional practical knowledge and skill.

The second point to which I would call attention, is the preparation of the ground for the reception of the seed. Too much care cannot be bestowed on this; the land should be well ploughed, the deeper the better, four or five months before the time of sowing, and allowed to lie follow. If there is rain in the interval, it should have a second ploughing, so as to keep it thoroughly open, and exposed to the joint action of the air and sun, which, while it prevents excessive absorption of heat, greatly promotes fertility, and cleans the land by exposing and killing the roots of such perennial weeds as may be in it: lastly, it should have a final ploughing, just before sowing; if sown in drills according to the American practice, it should, while the plant is still small, be ploughed once or twice between the rows; if broad-cast, this cannot be so conveniently done, the hoe can then suffice: after the third leaf has appeared, the ground is hoed and the plants thinned out to six or eight inches between them; this will leave enough to allow for considerable destruction during subsequent ploughing; a second hoeing is always deemed necessary, both in the American and native practice, when the "stand" should be still farther thinned to form a foot to eighteen inches between the plants. If the growth is vigorous, not less than eighteen inches should be allowed, otherwise a foot may suffice. In moderately fertile and high and dry lands, two and a half to three and a half feet between the rows is enough, but for moist, low-lying, rich lands, 5 feet is not too much: in such circumstances the bushes will still fill the ground: it being a very strong growing plant, unless it has plenty of room, the crops blight. So managed, I have seen the produce amount to 1,000 to 1,100 lbs. per acre, but half this may be considered a fair crop, which is double the amount of what in this district is considered a good native Cotton crop, and the exotic, owing to the higher percentage of clean to seed Cotton, yields 100 lbs. (in the above crop) more of the former than the native would do. The labor and care bestowed in cultivation is certainly great, but the return must more than cover it, even leaving out of consideration the higher value of the Cotton produced, which of itself would afford ample compensation, supposing the yield of clean Cotton to be only the same.

The last point to which I shall direct attention is, that, however promising in appearance, we have never succeeded in obtaining a really good second crop from the same bushes. I therefore recommend the plan of cultivating the Mexican Cotton plant as an annual, and never sowing the same land oftener than every third or fourth year, as it seems a very exhaustive crop.

In May 1852 Dr. Wight again wrote:—

During the first four or five years of the existence of the farms in Coimbatore, experiments to ascertain the comparative advantages

CSL

attending the cultivation of the native and exotic plants were annually made, and invariably terminated in favor of the latter. But still the native lookers-on would not be persuaded to believe our report, even to the extent of satisfying themselves by a repetition of our trials : they would not, in short, see the matter in the same light as we did. The case is now altered ; the objectors have at length made the experiment : and are becoming convinced by their own experience of the truth of what we have so long labored in vain to satisfy them, *viz.*, that the exotic is a less precarious and more profitable crop than the native Cotton.

Within the last two years the farms have ceased to operate practically, and the cultivation has passed into the hands of the ryots. In the course of this brief period the quantity grown by them has augmented from about 10 to upwards of 100 bales, and, doubtless, *if they only find a steady demand for this article*, they can, and will indefinitely enlarge this amount. It is to be hoped, therefore, that the demand will continue and increase.

Last season (1850-51) * * * those who cultivated both, found that the American gave them acre for acre heavier and more profitable returns : thus encouraged, they repeated the experiment this year (1851-52),—which has been one of the most unfavorable seasons for Cotton growing experienced for several years—and with more marked success. Two nearly adjoining fields similarly cultivated, and sown at the same time with exotic and native seed, have respectively, from equal areas, produced 1,250 lbs. and 500 lbs. of seed Cotton, the former worth Rupees 50, the latter Rupees 15 : the former is still in full vigor, and will, in the course of two months, give another, and (as there has of late been much rain,) I expect a much larger crop, while the native is quite done, and the land cleared. In this instance the native was sown on highly assessed black soil, the American on red sandy soil. The preceding season both had been sown on the black soil, and the result was still so far in favor

CSL

of the exotic, that Rupees 50 were received for it, and Rupees 20 for the native.

Dr. Wight, in the course of this interesting paper, notices an experiment being then made close to the coast, by Mr. D. Lees: the interest of his remarks being local, they are not reproduced here: he insists, however, on the great advantage of a loose sandy soil, where it will grow Cotton: as to the cheapness of tilling it, he says that he could, with five pairs of oxen, keep an extent of crop well-tilled in such soil as Mr. Lees was cultivating, which it would take fifteen, or even twenty pairs to farm in Coimbatore: the very sandy soil of the coast can be ploughed in all weathers, whereas in Coimbatore a good fall of rain is necessary to soften the ground there sufficiently for the plough, and before the preliminary operation can be got over, it may be again too dried up to admit of the seed being put in: this of course necessitates a large establishment of cattle and laborers, and greatly enhances the cost of production.

He also recommends shelter being furnished to the Cotton fields where strong winds prevail: he suggests rows of castor-oil plants, twenty or thirty yards apart, being planted in the fields, so placed as to protect the Cotton plants, with whose growth he does not think they would interfere.

Mr. C. C. Jackson, along with a report which he made to Government on the experimental cultivation of Cotton at Agra, under Mr. Finnie's direction, forwarded an account of the best native methods of treating the crop, when it was desired to produce the best quality of fibre: this is in the form of a memorandum and estimate, and is translated from the vernacular as follows:—

Dhoomut and mutyar lands are the best, and those best adapted for Cotton are called oomra, or land from which a rubbee crop of wheat or barley has been obtained, in consequence of the care with which the land has been prepared for those crops. Suret or land which has borne no rubbee is not so good.

The bunnowla should be rubbed in gobur, and then dried in the sun previous to sowing: by rubbing, the remains of Cotton adhering to the seed are removed from it: the gobur also acts as manure. Times of sowing are:—

First or jumowa sowing, the beginning of Jet, or the end of Bysakh.

CSL

Second or asaroo sowing, on the commencement of the rains of Asar.

The jumowa is sown on land from which wheat has just been reaped, which should be ploughed once before and once after sowing, and requires some little manure, about 4 or 5 mans to the biga : this is the best crop.

The second or asaroo is sown when the rains begin to fall : the land, if suret, is ploughed three times, and once again after sowing : if the land is domra, one ploughing is enough

When the seed germinates, its red bud, called sooee, appears generally eight days after sowing : two days after which, in the jumowa sowings, is the time for irrigating it, which should be continued every ten days, if rain does not fall : brackish water will not answer for irrigation. Two bullocks and three men in two days can irrigate one biga. Eight days after germinating the plant should be cleaned by clearing away the grass with a koorpa, and loosening the soil about the roots to admit of the water penetrating to them: the cleaning should be repeated, if possible, every ten days : it should never have less than three cleanings.

In good well-cleaned land the plant grows to the height of three cubits, in inferior and ill-cleaned, to two or two and a half.

The plant begins to bud two and a half months after sowing : in fifteen days more it blossoms of a yellow color, and in seven or eight days more it forms a pod, and in one month afterwards it bursts, and is ready to be gathered in the end of Aghun. If there is no severe cold or frost, it may be gathered to the end of Poos : in jumowa sowing the gatherings begin four and a half months after sowing ; in asaroo sowing three and a half months after : there are sixteen gatherings in the best crop, or twelve in an average crop, at intervals of five days.

One biga can be gathered by two men in a day : great care must be observed in gathering to avoid mixing leaves with the Cotton, which renders it objectionable to contract for the picking of the fruit by weight: if not gathered in time it falls on the ground, and gets full of dirt.

Expense of cultivating one biga.

Rent of land	Rs.	3	8	0
Seed	„	0	4	0
Seed of other kinds sown with the Cotton, such as til ...	„	0	2	0
Ploughing, &c.	„	1	0	0
Irrigation	„	1	2	0
Five cleanings	„	1	9	0
Twelve pickings	„	1	8	0
Cleaning the Cotton	„	1	1	0
Total,	Rs.	10	2	0

Which should produce 3 mans and 20 seers of raw Cotton, or 1 man 6 seers and 12 chittacks of clean: value 7 to 10 Rupees per man.

Mr. Jackson in the same report writes thus:—

While Mr. Finnie's experimental Cotton farm proved a failure, a small portion of land cultivated in American Cotton as an experiment by one of the Tehsildars of the district, produced Cotton which Mr. Finnie himself declared equal to some of the best American produce, showing that the country is capable of producing Cotton fit for the English market.

The following description of his method of treating the crop, its cost and value, is given by the Tehsildar:—

Bissesshur Dyal's Memorandum.

Early in the hot season I engaged a patch of 17 biswas of land, of the denomination mutyar chahee. It had chunna upon it last rubbee, and in the month of Jet I had 80 mans of manure thrown upon it,

MINISTRY OF CULTURE · GOVERNMENT OF INDIA
GSL

and the whole well watered; I then gave it three ploughings, and formed it into long beds 2 feet apart from each other, that is, the furrows dividing the beds were 2 feet apart from each other. When the soil was well softened and powdered, I sowed three and a half seers of Cotton seed in the furrows: on the 7th of May, five days after sowing, I watered, or filled the beds with water, allowing the damp to go to the seed in the furrows; on the 20th and 29th of May two more waterings were given, and I then weeded the young plants. In the month of June the beds were watered four times, at intervals of a week; when the rain fell the watering was discontinued; on the 22nd July I again weeded and hoed or loosened the earth at the roots. At the latter end of September, when the drought began to be felt, I gave the field a good watering, and it began to look fresh again. On the 10th of October the picking commenced in this way. To each picker I gave two coarse cloth bags, in one the clean Cotton was put, and in the other the inferior and dirty kind; the pods were plucked off gently, so as to bring no leaves with the Cotton, and the pickers were instructed to separate the Cotton from the dried leaves of the pod itself, and to be careful to put in only the Cotton. The time chosen for picking was from dawn or break of day to nine o'clock, when the plant, being moistened by the night dew, yields easily to the hand, and there is no dust flying about. The total produce was 3 mans; but I think if the land had been watered two or three times, instead of once, before sowing, and twice during the failure of the latter rain, the produce would have been much greater.

These finer kinds of foreign Cotton will not, I think, ever thrive like the dasee Cotton, which, after being sown in the rains, is left to its fate, never watered, never hoed, or cared for; it is only weeded.

In a tolerable season 4 mans of produce to a biga, or 7 to the acre, may be fairly calculated upon, as my experiment has yielded 6 mans and 2 seers per acre, with all the defects I have noticed.

It should be noticed that when the plants came to a foot high, wherever I thought them too close together, I thinned out some, allowing small spaces to remain between each plant.

Account of Cost.

Rent of 17 biswas of ground, at Rupees 2-8 per biga ...	Rs.	2	2	0
Manure	„	1	8	0
Ploughing	„	1	5	0
Watering	„	2	3	0
Weeding	„	0	12	0
Picking	„	0	10	0
	Rs.	8	8	0

3 mans of seed Cotton, at Rupees 3-4 per man	Rs.	9	12	0
Refuse	„	0	5	0
Total proceeds	Rs.	10	1	0
Net profit	Rs.	1	9	0

These papers are placed here rather than in the body of the work, as, though they doubtless convey useful information, they seem rather to refer to what ought to be, than to what had been done; a comparison of the two statements of cost certainly suggests that some of the Tehsildar's labor (for picking, for instance) was, considering the extra care which he says he bestowed, and remembering that the quantity is the same, wonderfully cheap.

Dr. F. Royle has written much on the subject of culture: the following extracts are made from his *Culture and Commerce of Cotton in India*:—

In the West Indies they used, in land that had not been cleared, to fell and set fire to the trees, and dig holes, for the seed. These were straight lines, and in a quincunx form, about fifteen or eighteen inches deep, and about a foot wide, and as wide at the bottom as the top. They were then filled up again lightly to the level of the soil. The distance of the rows varied : in level and fertile districts the distances were larger than in poor and mountainous situations. The sowing may be performed in any one of the six months from November to August inclusive. The seeds were then sown about twelve in number, at equal distances asunder, and then lightly covered to the depth of half an inch, or an inch, with mould. They spring up in three or four days, when the weather has been showery, and when the shoots have been three or four inches above ground, all, with the exceptions of three or four to each hole, were pulled up by hand: the ground was then carefully weeded, and the operation repeated as often as might be required. At the end of the third month, or earlier, all the young plants, except one, were drawn from each hole: where they had attained a height of eighteen or twenty-four inches, it was usual to pinch off its top, which was found to favor the formation of lateral branches, as in other places, where the growth is luxuriant.

In Guiana, where the Kidney Cotton *(gossypium Peruvianum)* is chiefly cultivated, the plants do not produce a full crop before the second year of their growth, but remain productive four or five years. Fresh plants or seeds are introduced into the field where the old ones appear to become deficient. Pruning takes place in the second year of growth: and is commenced some time between April and July. The whole produce is most commonly gathered in by April: the following month is considered to be the fittest for pruning, which will occupy the whole strength of the plantation during four or five weeks; it is advisable to keep the height of the plants about 4 feet: but this will, of course, depend on circumstances.

Careful weeding is essential, and thorough hoeing at least three times between the pruning and the gathering of the crop. The blossoms generally appear about the end of July or beginning of August, after which the pods form a regular succession. Some Cotton may be ready for picking in September, but principally after the middle of October, and the crop is not all got in until the end of December, forming what

CSL

is called the first crop. After this time the planters look for more or less rain during two or three weeks, which causes the trees to vegetate luxuriantly, and to put forth their blossoms anew, so that by the end of February the picking of Cotton may be recommenced. The second crop lasts generally until the middle of April. Weeding must be carefully attended to as in the first year.

In the *Directions for the Culture of Cotton in Africa*, it is stated that no plant requires so little rain as Cotton. Sowing is recommended to take place in the early part of the rainy season, or the operation may be deferred until the rains are within a month or two of their termination, with a view to guard against over-luxuriant vegetation, whereby the plants might exhaust their strength in branches and leaves, and to avoid the injurious consequences of rain as the blossoms are appearing. With regard to pruning it is recommended that an inch or more be broken or cut off the end of each shoot, which makes the stems spread and throw out a great number of branches, and this operation, if the plants are very luxuriant, will require to be performed a second or even a third time, with a knife, on the stems and branches.

The plant should be cut down every year within three or four inches of the ground. The time for doing this, which must be in the rainy season, ought to be regulated by the same circumstances which regulate the planting of the seed at first. But every fourth or fifth year the plants ought to be grubbed out, and their places supplied by plants grown from fresh seed brought from a distance.

In the Islands of France and Bourbon the cultivation of Cotton has only been followed since the year 1788-89. Towards the year 1796 the plant began to degenerate, and a greater quantity of Cotton was produced of a yellow, than a white color, owing, it is said, to the puncture of an insect. In 1811 the culture was little attended to, owing, it was said, to the greater quantity of yellow Cotton, which it was necessary to separate from the white.

CSL

Cotton seems to thrive best in warm low grounds, and within a league, or a league and a half of the sea-shore. This preference is not to be attributed to the vicinity of the sea, but rather to the difference of climate and temperature, which varies according to the degree of elevation, for it does not succeed on the side of the island exposed to the influence of the trade-wind, because in all this part the rains are too frequent. Flat, free, and too rich soils, particularly those which retain humidity, have been found little suited to the culture. In the driest part of the island leeward, they plant the Cotton tree about the month of November, and may do so as late as January, but in the parts where the rain is more plentiful, they may sow all the year round: the seeds are sown in lines: a slight blow of a pickaxe is sufficient to make the hole where they are to be deposited; and these holes may be 7 to 9, or 6 feet by 5 asunder: and the seeds, when sown, nine or ten in each hole, should be covered with about half an inch of earth. Some plant maize between the rows of Cotton trees. The slight damage which the shrub experiences, and the smallness of the first crop, are amply made up by the returns from the maize: any place where the seeds have failed must be re-sown. When the plants are three inches high, the number in each hole must be reduced to two or three of the strongest plants, near which the earth should be opened, and a little heaped up about each shoot, and subsequently to one plant, care being taken to keep the ground clear and free from weeds, at least until the plants are six months old.

At Bourbon, about the month of April, the Cotton tree begins to shoot its leaves. This fall precedes the blossoming, fifty days after which the picking begins. The blossoming varies from a month to a month and a half, but in general the earlier it takes place the more abundant is the crop.

If the Cotton tree has been planted in November or December, it bears in six or eight months: if in winter, it is more backward, and only produces in May or June. Until that time it requires nothing more than

CSL

clearing from weeds. Its greatest produce is when the plant is eighteen months or two years old: it is gathered in the months of June, August, and September. It has been known to produce a few pods in October and November, and some trees have sometimes, after the great crop, given a small one in the month of May following, but at this period, as after September, it is a mere gleaning. At the Isle of France opinions are much divided as to the advantage or necessity of pruning the Cotton trees every year, as by some they are only pruned every third or fourth year, and some never cut the plants at all. One advantage of pruning is stated to be that the planter is enabled to grow maize between the rows of Cotton: some advise that the plants should be removed after the third year, by planting in the rows usually intended for maize.

But the necessity or advantage of pruning and renewing must depend upon the peculiarities of soil and climate, and upon the luxuriance of the plant and its fruitfulness. * * *

* * * To suit the Indian climate several modifications of those methods of culture elsewhere in vogue must be adopted, such as deep ploughing in the first instances, to promote the ready absorption of moisture, and the ready diffusion of the roots through the earth: closer sowing and more hoeing to keep the ground clear, instead of repeated ploughing and hoeing. For open planting favors free ventilation, and by exposing the up-turned soil to heat, light, and air, frequently promotes evaporation and drying up.

Frequent ploughing between the rows will also have the effect of checking growth by cutting off any lateral radicles, though the Cotton-plant has comparatively few such. The planters of India, in a drier soil and climate, place their rows of plants much nearer to each other, or sow thick and broad-cast often with other crops. This may be detrimental to the Cotton in one way, but may be useful in shading the ground and preventing excessive dryness. The ridges appear not only superfluous, but injurious in a dry climate. For being raised, and forming a comparatively

CSL

thin stratum of earth, they must be heated and even baked by the powerful sun of India, and the tender radicle of the plant proportionally injured. Any rain which falls will also run off too rapidly by the water furrow on each side of the row of plants, which, though beneficial in a moist, will be detrimental in a dry climate.

But such terms as moisture and dryness are so entirely comparative that in one country we hear the Cotton plant described as one requiring moisture, and in another we find it stated that no plant requires so little. The fact being that the plant can bear both great heat and considerable want of water, provided it is growing in a not over dry atmosphere: but great differences may be observed in this respect even in the different seasons of the same country and climate. A good Cotton soil being both deep and light, permeable both by roots and rain, and a suitable climate, one that is moderately warm and generally moist, poor lands will produce fine crops in a wet season, and rich lands and river-bottoms by retaining moisture in a dry season. Even the depth of sowing will depend on the season and situation. Thus two inches may be deep enough in early spring, when the ground is moist and cold, and four inches not too deep later in the season, when the surface is dry and heated.

The distance to which the rows are kept must depend on the extent to which the plants are likely to spread, so that the ground be well covered and shaded. Therefore, according to the richness of the soil, should be the distance of plants: not being more than 4 feet in the Santee Hills of Georgia, and 8 feet apart in the Mississippi.

In the Journal of the Agricultural Society of India, Vol X., page 587, "a few brief directions to aid the cultivation of foreign varieties of Cotton in Northern India" are given, from which the following are selected:—

The variety of Cotton known as New Orleans* would appear to be the most desirable description for general culture in Upper Bengal,

---

* A short-staple, green seeded kind, whose fibre adheres rather closely to the seed.

CSL

Behar, and the North-West Provinces: while the Sea Island kind* would seem better suited to the Soonderbunds, and for both sides of the Bay of Bengal.

As a general rule, indigenous Cotton is sown in most parts of this side of India at the commencement of the rainy season: but in some localities the beginning of the cold season is the time chosen. For foreign Cotton, a short time previous to the setting in of the rainy season, is the period generally recommended for sowing, say in the month of May, after two or three good falls of rain have somewhat moistened the previously prepared land.

The land set apart for Cotton culture should be prepared in February or March, before it becomes too dry and hard for the plough to penetrate, it should be well ploughed, and all weeds carefully removed. In the United States the ground is cast into ridges after ploughing, but objections have been raised to the ridge system in India, so that it is not to be recommended beyond Bengal Proper, where it may probably be advantageously adopted.

During the month of May or June, according to circumstances, the seed should be placed in the ridges, the earth having been previously loosened. The ridges should be about 4 feet apart, and the seeds some 2 to 3 feet apart; three to six seeds in each hole, according to freshness or otherwise, and at a depth of between one and two inches. A greater space between the ridges, as much as 6 or 7 feet, and a greater distance between the plants, is recommended by some cultivators, but this rule depends much on the kind of Cotton to be cultivated, and on the character of the soil. The object to be attained is to grow the plants sufficiently far apart to prevent the branches interlacing, while at the same time they should be sufficiently close to shade the ground, and to prevent excessive drying up: if more than two seedlings appear in the holes, they should, when they have put forth their third or fourth leaf, be removed to a nursery, and retained to fill up any future vacancies in the plantation; in about ten days after, one of these two remaining seedlings should be removed; on no account should more than one plant be allowed to remain *in situ*.

---

* A long-staple, black seeded kind, the Cotton of which hangs loosely, and is easily removed from the seed.

From 3 to 4 seers of New Orleans seed, if fresh, should suffice for 1 acre. Of Sea Island 5 to 6 seers may be necessary for the same area: if the seed be tolerably fresh, and the weather favorable, it should germinate in a week: when the plants are well established a hoeing should be given, to keep the ground clean and to loosen the soil; it is an object to retain the soil loose, in order to allow the root (which is a tap one) to penetrate deeply, and to obtain a supply of moisture from a greater depth, and be better able to bear drought, and vicissitudes of season. When the plants are about eighteen inches high, the ground should be again hoed, if at all weedy, and the earth thrown up about the lower part of the stems.

In about three months from the period of sowing, if the season has been favorable, and the soil suitable, the plants will have attained a height of about 3 feet, and commence flowering. In another six to eight weeks the first crop of pods will ripen, or say in all October, by which time the rainy season is over, and the Cotton not liable to suffer from heavy moisture. If the cultivator finds that his plants are growing too luxuriantly, or too much disposed to produce wood or leaves, to the detriment of the flowers or pods, then it will be advisable to resort to *topping*, or, in other words, to take off an inch or two of the top, after they have commenced podding.

Equally as much attention is necessary to the careful gathering of the produce as to the previous cultivation of the plant: in fact, too much attention cannot be given to it to ensure a good clean staple. As the time for the bolls to ripen approaches, the cultivators must direct the pickers—

women and children are generally employed in the United States for this purpose, as the labor is light—to enter the plantation about an hour or two before sunset, provided with three bags suspended from their shoulders : in one bag the largest pods should be placed : in another pods of an ordinary size, and in a third such discolored and otherwise injured specimens as are obtainable either from the plant or from the ground. The pickers must be careful to lay hold of the pods only, without any dried leaves or bracts, as the admixture of such is very prejudicial to the quality of the Cotton : it is the absence of such careful picking, as well as the defective mode of cultivation, and removal of the Cotton from the seed, that causes the bulk of native-grown Indian Cotton to be so inferior. This operation must be performed daily, until the whole crop is gathered : care must be taken to remove the pods just as they are about to open, for if allowed to remain another night and the following day, the dew and sun conjointly affect the staple considerably, making it dry and harsh. In some parts of the United States the pods are gathered before they have commenced to burst, and then left to open in the shade, whereby the glossy appearance of the Cotton is said to be improved.

The seed from the largest pods exclusively is reserved for next year's sowing, so as to prevent deterioration of produce. The discolored portion in the third bag, leaves and other impurities, should be carefully picked out before the Cotton is allowed to be mixed with the contents of the other two bags. After this careful examination has taken place, the Cotton should be dried in the sun for a short time before ginning.

A few words in conclusion on the subject of manure and irrigation. In India manuring is seldom, if ever, resorted to for Cotton, but that it would be desirable to do so, for this, as any other culture, except in virgin soils, there can scarcely be a doubt, provided any kind of fertilizer can be obtained at a sufficiently moderate cost to warrant its introduction into the soil. Plants raised in moderately enriched soil, would probably

GSL

give a large yield, while they would be better able to stand drought, should the season be unusually dry.

In respect to artificial irrigation much diversity of opinion prevails, some contending that so far from improving the growth and staple of the Cotton crop, it acts injuriously towards it, weakening the fibre, and reducing its value, while others again are in favor of its application, asserting that it proves beneficial rather than injurious in seasons when the rains fail or vary in their supply.

In Lower Bengal such a process is scarcely, if ever, required, but in Behar and in the North-West Provinces it would appear to be very beneficial whenever it can be resorted to.

It is, however, extremely difficult, nay, impossible, to lay down any fixed general rules in regard to the artificial irrigation of the Cotton plant: much, of course, must depend upon the nature of the soil and climate where the culture is carried on: in some localities, where the soil is sandy and light, frequent irrigation will probably be found necessary for the successful growth of the plant: in other places a moderate degree of moisture only is essential: while again, in other localities, it may not be at all necessary, but, on the contrary, hurtful to the plant. In fact, each cultivator must be guided by circumstances according to soil and climate, whether to resort to artificial irrigation or to leave nature to pursue her own course.

IRRIGATION.

On this subject there exists, as is well known, great diversity of opinion, reconcileable, however, it would appear, by the fact, that different persons speak of different parts of the country, and that what has been found advantageous in some places has proved injurious in others. As far as concerns the Bengal Provinces, it is certain that the great preponderance of evidence is in favor of its utility: we have seen that Dr. Wight speaks of it as highly desirable in Madras: and Mr. George Vary, Superintendent of the Cotton experiment in the South Maharatta country, writes thus:—

The Cotton plant, as at present cultivated, is an annual: seed is sown towards the end of the monsoon, when the ground is full of moisture: the best plants seldom exceed three and a half feet in height, and

40 lbs. per acre of clean Cotton is considered a fair crop. After the Cotton has been collected the bushes are pulled up, and burned, as they all die during the hot weather from want of moisture: by irrigating Cotton you will be able to retain the same bushes for several years: I have seen a bush nine years old producing three crops yearly of fine Cotton: you will therefore get two or three crops yearly of fine Cotton instead of one; and instead of 40 lbs. per acre, you will get 200 lbs. or 300 lbs. yearly. And the quality of the irrigated Cotton is 150 per cent. better than ordinarily cultivated Cotton, which is easily accounted for. In the non-irrigating system, when the hot weather sets in, the bush for want of moisture becomes dried up and stunted. This renders the Cotton short and crisp. The sample of Cotton which I have seen grown in gardens, where there was planty of moisture, is as fine, long, and silky as any in the world, and there is no doubt, if it can be produced in large quantities, it would be preferred to American or any other Cotton.

In June 1858 Mr. Under-Secretary R. B. Chapman communicated to the Secretary of the Agricultural Society the following statements on the subject of irrigation:—

Mr. G. Inverarity, Collector of Broach, is of opinion that in his collectorate the deep black soil on which Cotton is raised, and to the growth of which it is especially adapted, does not require artificial irrigation: this is "far from improving the growth and staple of the "Cotton crop; it acts injuriously towards it, weakening the fibre, and "reducing its value to a corresponding extent."

The Bengal Sudder Board of Revenue is of opinion that artificial irrigation could be beneficially applied to Cotton in the District of Behar, but that it is not required in Bengal Proper.

The Agricultural Society's Cotton Committee believe that on light and dry soil it may be useful, in other places injurious. On the whole, the

Committee think, "that irrigation, under certain peculiarities of soil "and climate, acts injuriously on the Cotton plant, yet in most localities "it will be found beneficial alike to the indigenous and exotic kinds."

In Assam irrigation is considered unnecessary: Colonel Hannay, however, remarks, that in certain dry sandy soil there, it might, perhaps, be beneficially applied. The Government of North-West Provinces, forwarding the replies to their queries on this subject, of the Commissioners of Benares, Allahabad, and Jubbulpore, comes to the conclusion that the opinion of the best informed persons is against the application of irrigation in those divisions: and that it is not resorted to there. Mr. Gubbins, Commissioner of Allahabad, however, is in favor of irrigation, and has never heard that the process is injurious to the fibre of the Cotton.

The Resident of Hyderabad states that the Deputy Commissioner of North Berar thinks irrigation on the Cotton-growing soil of his district would prove injurious to both the quality and the quantity of the crop. The result of an experiment which he made with exotic Cotton was as follows:—"The new Orleans Cotton was spoilt by irrigation, but "throve well without it. Partial irrigation proved advantageous to the "Sea Island Cotton upon a red sandy soil, whereas a continuance of it "proved injurious. * * Irrigation, to a certain extent, is necessary on "shallow, stony, or sandy soils, and in every case it would reduce the "crispness of the fibre."

In the Raichore Doab irrigation was found to cause the plant to grow much larger, and yield a far greater quantity of Cotton.

In Rangoon and Bassein it is thought that irrigation would prove injurious.

The information from the Punjab states that in Goojranwalla irrigation is practised, and never considered injurious.

In Jhelum the plant is more or less dependent on artificial irrigation, though a large supply of water is not considered necessary.

GSL

In the Jullundur Doab the best Cotton is produced on unirrigated lands, irrigation being sparingly resorted to. *

In Paniput irrigation is employed, rain-water being preferred to any other.

On this subject Dr. Royle writes thus:—

As irrigation seems to be the sole remedy to be relied on in a great number of dry districts, it would appear that it had been unaccountably forgotten in the course of the extensive experiments that have been made in India. This was not, however, the case, for it is mentioned in the abstract, which I prepared for the use of the planters: they, when in England, objected to irrigation, when the author mentioned its occasional necessity in some parts of India: he tried to undeceive them by reading to them accounts of the culture and climate in different places * * * but they decidedly objected to moisture: the soil and climate could not be too dry after the plant had once taken hold.†

Indeed, in very dry climates, irrigation would appear the obvious remedy for crops which are said to suffer from excessive drought. But it is not so easy of application, nor so certain of being profitable, as would at first sight appear: small patches have, no doubt, been successfully cultivated in gardens with the aid of irrigation. And there is no objection to drawing an inference from such a fact, because careful Cotton culture is, after all, more of the nature of garden than of common field culture: that is, attention is paid to individual plants, they are each hoed round, and pruned, and the produce of each is separately picked.

---

* See ante.—The opinions of Mr. Vansittart and Dr. Sill.

† This seems to have been one of the few particulars in which experience had the effect of modifying the preconceived ideas of the American planters: Mr. Finnie and Mr. Blount both at last tried irrigation.

CSL

But we have no evidence to prove that in the Indian climate irrigation would be profitable, with a crop even of American Cotton : for every thing will depend on the quantity of the produce and immunity from the ravages of insects.

The great difficulty in applying irrigation to Cotton generally in India is, that you have to deal with a plant which has been raised in the rainy season, and which necessarily has all the habits of one accustomed to moisture, both of soil and climate, and yet it is one of which you must check the luxuriant growth, if you wish to have a sufficient production of flowers and fruit. This is done naturally in most plants by the heat and dryness of summer, and in Egypt, where Cotton is copiously irrigated, by the dryness of the climate. But in cultivating American Cotton in India you have a moist-weather plant, that is, one with short roots and broad leaves, exposed suddenly to dryness, when from the clearness of the sky and heat of the sun, there must necessarily be copious evaporation. The Indian species, which is a moisture and drought-enduring plant, withstands both the suddenness and the violence of the changes, but then it only produces a short-stapled woolly Cotton. The American, in such extremities, succumbs to the elements, and has to produce a new set of leaves and fresh flowers before it can yield any Cotton, and then only in situations where the cold of winter is not severe enough to kill the plants.

The danger with irrigation is that in the season of growth, which is the rainy season, you would only be adding to the evil of excessive moisture, if you then made use of it, and if it was not required you would be probably adding needlessly to the expense, if arrangements were made for keeping every thing in order to irrigate if necessary, or pay a water-rate for a dry crop which might be as profitable without it.

That it would be desirable in many cases to have the power of irrigating is evident from the sudden cessation of rain which occasionally takes place even during the rainy season for different periods, extending

CSL

sometimes even to a month. The time when irrigation would certainly be useful as far as our present information extends is at the conclusion of the rains, when there is suddenly a clear sky, heat, and rapid drying up; even then it would require to be judiciously applied, in order to make the transition gradual from the wet to the dry weather, but still the foliage would be in many places that of an exotic, which had been for months luxuriating in moisture and suddenly exposed to a different set of physical phenomena. In the more dry parts of the country this difficulty would not be experienced: and the crop would be more easily raised than in a locality which might be considered more favorable, as richer both in soil and climate: it is possible to produce good Cotton in the sands of Egypt solely by irrigation, but the climate there is dry and the plants have at no time been under the influence of a rainy season.

One difficulty with irrigation from canals in India is that they are usually allowed to dry up during the rainy season. During this time there is apt to be from the heavy rains considerable damages to the canal banks, which it will necessarily take a little time at their conclusion to repair. But it is at this very time, and immediately, that irrigation would be alone useful. * * * But the subject is of so much importance that it is extremely desirable to ascertain carefully the effects of irrigation on the American Cotton plant in two or three of the dry districts of India, as for instance in the Deccan, North-West India, and in the Punjab. The necessary facts might be ascertained on a small scale, as for instance with 1 or 5 acres in an open field, as well as with fifty.

With regard to the effect of irrigation on the indigenous Cotton of India, Mr. Landon, who had had much experience, emphatically pronounced against it: he said before the Colonization Committee, in 1858, that irrigation, as applied to Cotton in India, had completely failed.

Mr. Balston, however, who had seen much of the country, stated to the same Committee that "the effect of irrigation on the Cotton plant

" of India is to raise it from a small stunted annual, producing 50 or " 60 lbs. of clean Cotton per acre, to a large perennial plant, producing " 400 to 500 lbs., equal in quality in any thing grown in America. * * " It improves the quality of the Cotton, and brings it up to the standard " of the American crop. * * Water never fails to lengthen the staple " of Indian Cotton."

MINISTRY OF CULTURE · GOVERNMENT OF INDIA · संस्कृति मंत्रालय · भारत सरकार
सत्यमेव जयते
CSL

TABLE XI.

General Abstract of information given separately in other Tables above.

	(h) PRICE OF COTTON IN			Proportion of Indian Cotton to total quantity imported into England. (m)	Quantity of Cotton annually imported into England from Bengal. (m)	Total quantity of Indian Cotton imported into England. (m)	Quantity of Cotton exported from Bengal. (m)
	CALCUTTA.		LIVERPOOL.				
	Lowest.	Highest.	Average of Indian Cotton.				
	d. p. lb.	*d. p. lb.*	*d. p. lb.*		*Average.*	*Annual Average.*	*Annual Average.*
1755	(a)10·03	....	....	....	....	....	....
1790	(b) 2·14	(c)2·52	(d)21	....	....	....	....
1791	....	....	....	....	....	....	....
1792	....	....	....	....	....	....	....
1793	....	....	....	....	....	....	....
1794	....	....	....	....	....	....	....
1795	....	....	....	....	....	....	....
1796	....	....	....	....	....	....	3,903,738
1797	....	....	....	....	....	....	
1798	....	....	....	....	....	....	
1799	....	....	....	....	....		
1800	....	....	....	....	....	350,000	
1801	....	....	....	....	....		
1802(e)	....	....	15	....	....		
1803	....	....	....	....	....		
1804	....	....	....	....	....		
1805	....	....	....	....	....		
1806	....	....	18	....	....		16,470,990
1807	....	....	17½	....	....		
1808	....	....	24	....	....		
1809	....	....	25	....	....		
1810	....	....	19	....	....	1,97,500	
1811	....	....	15	....	....		
1812	....	....	20	....	....		
1813(g)	3·90	6·00	15¾ 19¼	....	....		
1814	....	....	27	....	....		
1815	....	....	23	....	....		
1816	....	....	20	....	....		33,533,285
1817	....	....	21	....	....		
1818	....	....	20	....	....		
1819	....	....	16	....	....		
1820	4·20	6·10	11¾	4 p. ct.	....	2,300,000	
1821	....	....	10	,, ,,	....		
1822	....	....	10	....	....		
1823	....	....	9½	....	....		
1824	....	....	9½	....	....		
1825	....	....	13	10 p. ct.	....		
1826	4·95	5·70	9	....	....		16,934,258
1827	4·35	....	6	....	....		
1828	....	....	6½	....	....		
1829	3·30	4·20	5	....	....		
1830	2·62	4·20	5¾	9 p. ct.	2,742,787	3,800,000	
1831	2·25	4·15	5¼	....			
1832	3·00	4·50	4¾	....			
1833	3·60	4·40	7¾	....			
1834	4·05	5·40	7½	....			
1835	4·20	4·68	8	12 p. ct.			
1836	3·07	4·68	7¾	....			31,380,575
1837	....	....	....	....			
1838	3·15	4·67	5¾	....			
1839	3·52	4·50	6¾	....			
1840	3·00	4·50	5¾	14 p. ct.	3,45,655	7,275,000	13,976,820
1841	3·30	4·53	5¼	....			
1842	2·77	3·90	4	....			
1843	2·70	3·86	3¾	....			
1844	2·47	3·56	4¼	....			
1845	2·51	3·45	3¼	11 p. ct.			
1846	2·47	3·60	4¼	....			9,900,407
1847	2·40	3·33	3¾	....			
1848	2·55	3·45	3¼	....			
1849	2·43	3·41	4¼	....			
1850	2·55	3·86	5⅛	16 p. ct.	(p) 1,766,864	14,075,000	
1851	2·51	3·87	4	....	1,175,910		22,663,188
1852	2·51	3·72	3¾	....	557,088		
1853	2·36	3·22	3½	....	7,660,242		
1854	2·46	3·37	3½	....	1,144,416		
1855	2·74	3·26	3⅞	18 p. ct.	86,912		
1856	2·85	3·30	4¾	....	1,418,928		
1857	2·95	4·50	5¾	....	2,538,560		9,702,974
1858	5·10	6·15	4¼	....	190,400		
1859	4·20	6·15	4¼	....	....		
1860	4·05	4·50	....	....	....		

(a).—Imported for Government from Bombay and sold by auction in Calcutta.

(b).—Cotton from the Deccan and North-Western India, imported by way of Mirzapore.

(c).—Broach and Surat Cotton.

(d).—These Liverpool prices are mostly, if not exclusively, those of Surat Cotton, and consequently higher than those represented in columns 1 and 2.

(e).—The average prices of 1790 are said to have obtained up to 1802 in Calcutta.

(g).—Up to 1813 the prices given are those of Cotton imported into Bengal: subsequently the export price. I have found the most positive assertions to the effect that up to that date the only Cotton exported from Calcutta was the surplus of Surat Cotton that had been imported, or an equivalent quantity of Mirzapore Cotton. See "Reports and Documents in regard to Cotton-wool," also Phipp, "Eastern Trade." Mr. Mann, however, treats Calcutta as an export port for Cotton since 1796.—See column 7.

(h).—Column 4 is taken principally from Dr. Royle's figures and diagrams.

(m).—Columns 4, 5, 6, and 7 are taken from Mann's "Cotton Trade."

(p).—Up to 1849, the figures in column 5 are averages calculated as annual from the total quantity exported at intervals of ten years, subsequently the actual quantities.

MINISTRY OF CULTURE · GOVERNMENT OF INDIA ·
संस्कृति मंत्रालय · भारत सरकार
CSL

CSL

ALPHABETICAL INDEX.

A.

Pages.

Agabeg .. 83
Agra 204, 206
Akra 86, 296
Akyab 135, 137
Allahabad 187, 189
Allen 19, 23, 51, 327, 371, 380
Alluvium .. 29
Allighur .. 213
American (Cotton) .. 2
Ditto (Planters) .. 304
Amraoti .. 272
Amherst .. 154
Analysis 424, 431
Andaman .. 157
Arracan 29, 135
Aspect of Bengal .. 28
—— North-Western Provinces .. 165
—— Central India .. 242
Assam 125, 364
Auckland, Lord 304, 306, 343
Ava .. 150
Azimghur .. 180

B.

Bazely 61, 82
Basdea (Island) .. 85
Barrackpore .. *ib.*
Bankoorah .. 93
Balasore .. 97
Backergunj .. 113
Bareilly .. 210
Banar (River) .. 347
Bah .. 341
Bayles 308, 316, 382
Bandah 195, 305
Bagcheni 373, 378
Bell 7, 18, 86, 206, 253, 369, 380, 383
Bebb 18, 106
Bengal .. 28
Behar .. 62
Beerbhoom .. 91
Benares 178, 184
Bellari .. 275
Berar 257, 278, 279
Berari .. 249
Berkley .. 225
Bhawulpore .. 243
Bhilsa .. 246
Bhaugulpore 68, 70
Bijawur .. 252
Bickrampore .. 350
Bickell .. 424

B.

Pages.

Bijnour .. 213
Bingham .. 61
Birmah 138, 150
Blundell 153, 277
Blount 180, 309, 317, 325, 329, 337
Bonnevie .. 77
Bolarum .. 276
Borailli .. 103
Boga .. 91
Bogra .. 78
Bogle .. 126
Brandis .. 144
Bruce 6, 18, 194, 306
Bramaputra 34, 356
Bridgeman .. 181
Brinjoo Soondur Roy .. 99
Brinjarees .. 267
Briggs .. 2
Bundlekund 167, 252
Burnes .. 138
Buxar .. 60
Burke .. 73
Burdwan 91, 93
Bulloa 92, 117
Budaon .. 210
Burn .. 384
Bucktabulli .. 357
Bunsee (River) .. 345
Bundharra 268, 270
Bushby 253, 276
Buttala .. 240
Byrowal .. 234
Byratti .. 108

C.

Canal 18, 220
Carter .. 60
Cachar .. 114
Campbell .. 132
Cawnpore .. 194
Calpee 198, 309
Cappassia 346, 351
Candeish .. 271
Carselis ... 272
Carriage,—Agra 374, 375, Allahabad 188, Bengal Seaboard 31, Bengal Alluvium 33, Bengal Uplands 35, 46, 52, 54, Benares 178, Birmah 147, Chota Nagpore 125, Damun-i-koh 74, Jungul Mehals 100, Hissar 227, Hyderabad 274, Malwah 246, Morung 133, N. W. Provinces generally 171, 172, Pooree 100, Rohilkhund 208—see also TABLE II., p. 160, and TABLE III., 285.

C. *Pages.*
Central India .. 242
Chanderi 19, 207, 247
Chirkari .. 252
Chutterpore .. *ib.*
Chumbul .. 253
Chutteesghur .. 269
Chindwarrah .. 270
Chandah .. 269
Chemical Papers .. 394
Cholae Muhaisore .. 249
Chowria Newae .. 373
Chatsoo .. 373
Chauk .. 310
Chybassa .. 124
Chota Nagpore .. 120
Chittagong 116, 118, 135
Chintea .. 77
Chumparun 66, 124
Chynepore .. 61
Cossimpore .. 346
Cooke .. 183
Cook, J. and Co., 73, 82, 87, 120, 128, 195, 197
Cobet .. 381
Coompta .. 275
Concan .. 274
Cape .. 242
Cowell .. 232
Colvin .. 219
Cost of cleaning Cotton (separating seed) generally 171, 172, 287, Agra 391, Assam 367, Amherst 54, Berar 391, Calpee 200, Coimbatore 390, Etawah 382, Hyderabad 274, Malwah 390, Nagpore 260, Nimar 391, Pegu 147, 149, 150, Punjab 235, Rutlam 391, Tinnevelly 390, of experiments at Akra 296, Mr. Bell's 376, 377, 378, 379, 380 (by estimate) 371, 372, the four Planters 326, 336, 337, 342, Mr. Price's 358, 367, 368, of Machinery (gins) 391, 392, Mr. Mather's Churkas 387, 388, of production of Cotton general question 22, 54, 293, 294, Bengal generally 47, N. W. Provinces generally 169, 171, 173, Akra (Mr. Deverinne's estimate) 300, Assam 127, 128, Benares 186, Bareilli 211, 212, Cawnpore 194, Calpee 200, 202, 203, Chittagong 118, 119, Dacca 104, 105, 109, Hissar 226, Hyderabad 284, Jullundur 233, Jungul Mehals (Cuttack) 100, Morung (Darjeeling) 133, 134, Malwah 245, 246, Pegu 143, 147, 151, Raepore 265, 266, Rhotas 62, Rohilkund 208, 209, Tirhoot .. 65
Crawford .. 6
Cuttack .. 96
Cultivation.—General question of 14, 19, Rules for 465, Mr. Mercer's rules for 439, Dr. Wight's paper on 440, Dr. Royles' papers 460, Dr. Thompson's 432, In Allahabad 90, 93, 189, Andaman 157, Arracan 136, Assam 129, 130, Agra 456, Akra 297, Bhilsa 247, Berar 257, Behar 63, Beerbhoom 92, Benares 185, Bandah 196, Cawnpore 195, Cachar 115, Chittagong 118, 120, Cuttack 98, Chanderi 249, Calpee 200, Chota Nagpore 121, 124, Delhi 221, Dacca 101, 105, 108, 111, See also Mr. Price's Narrative 344, Hissar 226, Hyderabad 278, 280, Lucknow 229, Morung 132, Moorshedabad 80, Nagpore 262, 263, 265, Nimar 251, Nerbudda Valley 255, Punjab 237, 238, 240, Pergunnahs (24) 87, 88, Pergunnahs (Sontal) 73, Pegu 139, 142, 145, Rewah 254, Rajputana 241, 242, Rungpore 76, Shorapore 275, Sylhet 114, Sooonderbunds 83, Shahabad 58, Tenasserim 155, Tirhoot 65, (see also) by four American Planters 430, Currie .. 215

D.
Davidson 277, 282
Dalhousie (Lord) .. 383
Datia .. 252
Davis .. 147
Darjeeling .. 132
Dacca 101, 105
Damin-i-koh 73, 74
Davies . 61
Dearman .. 111
Decline of trade 8, 16, 291, 292
——— of production in India 2, 7, 293
——— of production in Bengal 44, 8
——— of production in the North-Western Provinces .. 174
Delessurri .. 346
Deverinne .. 297
Deb (Radakant) .. 246
Dera Ismael Khan .. 241
Dera Ghazee Khan .. *ib.*
Derajat .. *ib.*
Delhi .. 219
Dhunnoor .. 243
Dharwar 275 283
Dharasco .. 278
Dhanna .. 130
Dhera 126, 130
Difficulties to advance of cotton trade, 9, 11, 14, 21, 25, 30, 33, 35, 50, 173, 174, 253, 259, 260, 263
Dinajpore .. 78
Doab .. 166
Dorin .. 273
Dunbar 107, 358, 349
Duncan 19, 184
Durrung .. 131
Dumroy .. 346
Dum Dumma .. 365

E.
Edgeworth .. 196
Eglinton ... 154
Ellenborough (Lord) 295, 344
Elliot .. 263

GSL

E. *Pages.*

Etawah 204, 381
Export from Agra 370, 373, Allighur 214, Amherst 155, Arracan Hills 136, Assam 367, Assam and Garrow Hills 126, Bengal generally (see Table VI.) 291, Berar 258, Bundlekhund 253, Calpee 204, Chittagong 118, Cuttack 99, Chota Nagpore 121, Darjeeling and Nepal Morung 133, Delhi 218, 225, 340, Gorukpore 182, Jungul Mehals (Cuttack) 100, Hyderabad 272, 273, 284, Malwah 245, 250, 251, Mirzapore, 184, Nagpore 259, 264, 268, N. W. Provinces generally 171, 174, Palamow 124, Pegu 139, 143, 145, 147, Punjab 239, 240, 241, 242, Rajputana 243, Sagur and Nerbudda Territories 256, Saharunpore 217.

F.

Falconer ... 306
Fenwick .. 273
Field .. 58
Finnie 211, 309, 313, 319, 325, 333, 340
Foolaberia 349, 363
Fraser 247, 314
Frost .. 336
French .. 90
Freeman .. 19
Furrell .. 64
Furreedpore 112, 346
Futtehpore .. 194
Furruckabad .. 205
Fytche ... 155

G.

Ghazeepore .. 179
Gibbon .. 57
Gins, 3, 24, 143, 192, 261, 268, 277, 281, 284, 302, 308, 333, 336, 341, 369
(See chapter on Machinery) .. 381
Glass .. 353
Godavery 270, 271
Goorgaon .. 244
Gorukpore .. 180
Gouger .. 139
Gowalpara .. 130
Gowhatti 126, 368
Gwalior .. 244

H.

Hatras ... 341
Hamilton 65, 245
Hannay .. 129
Haughton 123, 157
Hazareebaugh .. 121
Harris .. 89
Hartie .. 86
Hastings .. 85
Henzadah .. 144
Helfer .. 152
Henderson .. 295
Hill .. 83
Hidgelee .. 96

H. *Pages.*

Higgins .. 424
Hingunghat 261, 264
Hissar .. 226
Hollings .. 237
Hosungabad .. 255
Hoogly .. 95
Huffnagle 86, 88
Hunter .. 99
Huggins .. 189
Hummeerpore 198, 319
Huttia .. 117
Hyderabad .. 271

I.

Import—of cotton into Bengal 39, 41, 44, 139, into England, see Tables VIII. and IX. 292, and Table X. 293, into Agra 373, Benares 186, Chanderi 248, 249, Debra 218, Dinajpore 134, Gorukpore 182, Mirzapore 184, Pooree 100, Purneah 133, Rungpore 77.
Indore .. 245
Irvine 244, 249
Irrawaddi 138, 142
Irrigation—general notice of, 469, in North-Western Provinces 169, Mr. Saunders on 173, Allahabad 188, 189, Allighur 214, Agra 334, Bundelkhund 193, Bareilli 211, Bolundshahar 214, Coimbatore 452, Cuttack 99, Delhi 219, 222, Gorukpore 338, Hissar 228, Hyderabad 278, 283, Lucknow 230, Moorshedabad 80, Nagpore 261, Punjab 234, 237, 241, Seetapore 231, Shahabad 58, 61, See also Mr. Price's Narrative 344.

J.

Jackson (W.) 76, 127
——— (C. C.) 333, 336, 340, 344
Jamookandi .. 80
Jeagunj .. *ib.*
Jessore .. 90
Jenkins 127, 365, 384
Jhansi .. 252
Jounpore .. 187
Jullundur .. 233
Jubbulpore 254, 255, 305
Jynteah .. 116

K.

Kamgaum .. 272
Kangra .. 240
Kishnaghur 89, 90
Kistna 271, 275
Kirke .. 217
Kosee .. 341
Kotra .. 310
Kohat .. 242
Kookis .. 115
Kumaon .. 213
Kursiong .. 132
Kyd ... 82
Kusrode .. 251

Pages.

L.

Labor, in Bengal generally 31, 33, 36, in North-Western Provinces 175, 176, Akyab 138, Backergunj 83, 85, Birmah 146, 150, Cuttack 97, Calpee 202, Delhi 223, Morung 133, Nagpore 259, 260, Palamow 124, Raepore 267, 268, Sontal Pergunnahs 73, See also Mr. Finnie's remarks 313, 315, 321, 322, 334, and Mr. Price's 352, 366,
Landon .. 6
Lamb 106, 110
Langlois .. 137
Lane .. 139
Laird .. *ib.*
Lambert .. 190
Lahore ... 240
Lawrence .. 236
Lawford .. 452
Leyburn .. 58
Lohardugga .. 122
Lloyd .. 144
Lowther 191, 329
Low .. 272
Lucknow .. 229
Luckye .. 346
Luckimpore .. 130
Luckipore .. 117
Lush .. 18

M.

Mackay .. 7
Map 39, 177
Malda .. 79
Maunbhoom .. 122
Maingy .. 152
MacFarquhar .. 153
Mann 173, 291
Mackenzie .. 342
Manickgunj 350, 363
Machinery .. 381
Maudesly .. *ib.*
Mather .. 383
Mahanuddi .. 267
MacLeod 252, 255, 306
Mercer 19, 254, 256, 309, 312, 319, 325
Metcalfe .. 82
Mechi .. 132
Mergui ... 154
Merut 213, 215
Megna .. 345
Midnapore .. 94
Mirzapore .. 183
Mozuffernuggur .. 216
Mooltan .. 241
Mooradabad .. 212
Mornay .. 128
Mookerjee .. 121
Moore .. 84
Moorshedabad .. 80
Morung 70, 133
Monghyr .. 68

Pages.

M.

Muttock 125, 128, 365
Muir 171, 287, 288
Muttra .. 205
Mymensing 112, 356, 352

N.

Naturalization, of exotic cotton——Chota Nagpore 123, Damin-i-koh 73, 74, Hyderabad 240, Kishnaghur 90, Mymensing 352, Punjab 240.
Napleton .. 70
Nagas .. 115
Nagpore 258, 268
Nerbudda Valley .. 254
Negrais (Cape) .. 29
Nimar 246, 251
Nokalla .. 78
Nowgon .. 131
Nuddea 81, 89
Nurma 93, 108
Nursingpore .. 254

O.

Orissa .. 30
Ousley .. 122
Oude .. 229

P.

Palmyras (Cape) .. 29
Patna 55, 56
Palamow 62, 121
Parisnauth .. 71
Patrick .. 301
Panwell .. 272
Parke .. 241
Paniput .. 226
Peshawar 241, 242
Pestonjee Viccajee .. 273
Petrie .. 384
Pegu .. 138
Pergunnahs (24) .. 85
„ (Sontal) .. 71
Pearkes .. 42
Phootee .. 108
Phayre .. 142
Phillibeet .. 211
Physical features, importance of 28, Bengal 28, 37, North-West Provinces 165, Central India, 242.
Phipps .. 291
Plowden .. 259
Poorelia .. 124
Pooree .. 99
Pontet .. 72
Potter .. 383
Prospects of trade 17, 48
Production, 41, see cost of production
Price, 104, 125, 141, 163, 344, see also Table I. 159. Table II. 160. Table III. 285. Table IV. 287, 288. Table V. 289, 290, and Table XI. at commencement of volume.

P. *Pages.*
Prinsep 82, 238, 303, 306
Pringle .. 98
Prome .. 141
Profits 77, 164, 171, 227, 455, 460
Purvis .. 229
Punjab .. 232
Punnah .. 252
Pubna .. 79
Purneah .. 69
Pyngunga .. 271

Q.
Quinten .. 62

R.
Ravenshaw .. 56
Rajmuhal .. 71
Rajshahye 74, 79
Radanagore .. 94
Ranchee .. 122
Ranigunj 124, 133
Ramree .. 136
Rauth .. 310
Rajputana 243, 373, 274
Raichore 275, 279
Rajapore .. 274
Raepore 262, 266
Rawul Pindee .. 241
Rewah .. 254
Reade .. 339
Rhotas .. 62
Riddell .. 276
Royle 82, 216, 302, 308, 327, 418, 460
Robinson 84, 122, 243
Roghé .. 137
Rohilkhund .. 208
Ross .. 264
Rohtuk .. 226
Rungpore .. 75

S.
Saharunpore .. 216
Sagur .. 252
—— Island .. 82
Sagur and Nerbudda Territories 254, 256
Saunders 74, 169, 173
Salween .. 146
Sandoway .. 136
Saikwah .. 130
Santipore .. 89
Sarun .. 66
Science, Mr. Finnie's views of .. 321
Sconce .. 118
Serongee .. 109
Seabrook .. 421
Seoni .. 255
Shapore .. 241
Shorepore 274, 281
Shajehanpore .. 210
Sheraj .. 102

S. *Pages.*
Shurr .. 90
Shahabad .. 57
Singbhoom .. 124
Sitang .. 142
Singapore .. 156
Simms .. 383
Sill 233, 325
Skinner 12, 226
Sleeman .. 207
Smith 218, 220
Soils .. 45
Analyses of, 394, 424, Dr. Royle's remarks on 418, Allahabad 188, Assam 125, 364, Arracan 136, Akra 300, Agra 334, Bhilsa 247, Berar 256, 283, Behar 64, Bhaugulpore 71, Beerbhoom 92, Benares 179, 184, Bundelkhund 167, Calpee 198, 200, Cachar 115, Chittagong 118, 120, Chota Nagpore 121, 124, Chunderi 249, Dacca 102, 112, Doab 166, Gorukpore 181, 331, Morung 132, Mehals (Jungul) 100, Midnapore 95, Monghyr 68, Malwah 248, Nimar 251, Nagpore 258, 266, Pegu 141, 146, Punjab 234, 237, 238, Rungpore 76, Singapore 156, Sylhet 114, Sarun 67, Shahabad 58, Shorapore 275, Seetapore 231, Tirhoot 65
Sontal Pergunnahs .. 21
Soonderbunds .. 81
Soory .. 91
Soonamooky .. 93
Somirpore .. 310
Sonargon .. 347
Solly 419, 422
Sonepore .. 267
Sone River 178, 183
Spinning at Chunderi 249, Dacca, 108, in Bengal villages 46, Chandah 270, Hyderabad 274, Nimar 251.
Spiers .. 249
Spalding .. 420
Speede .. 87
Stanbrough 259, 270
Stacy .. 111
Surat Cotton 2, 42, 45, 79
Sundeep 82, 117
Sumbulpore 97, 100
Surreemuddi .. 346
Suttipore .. 351
Sumurthan .. 275
Sumpter .. 252
Sutwas .. 246
Sylhet .. 113

T.
Tagore .. 84
Tangori .. 103
Tavoy .. 154
Taylor 274, 280, 283, 384

Pages.

T.

Tables, I. 162, II. 163, III. 285, IV. 287, V. 289, VI. 291, VII. VIII. IX. 292, X. 293, XI. at commencement of volume.
Terai 67, 166
Terry 76, 309, 311, 318, 325, 328
Tezpore 126, 367
Teesta .. 132
Tehree .. 252
Thomason 230, 369, 380
Thompson 46, 432
Tharrawaddi .. 144
Tipperah 117, 355
Tiery .. 82
Tirhoot .. 65
Toke 352, 357
Trade 1, 41
Transport, see Carriage
Turner 4, 379
Tucker .. 183

U.

Uplands 29, 34
Ure .. 421
Umritsur 234, 242

V.

Vansittart 232, 235
Vernor .. 137
Voyle .. 227

Pages.

W.

Waste lands fit for Cotton.—Assam, 127, 128, Akyab 137, Amherst 154, Backergunj 113, Baukoora 94, Banda 196, Bareilli 211, Bundelkhund 253, Chindwarra 270, Chumparun 67, Cuttack 97, 99, Cachar 115, Chittagong 117, 122, Chota Nagpore 121 Darjeeling Morung 132, 133, Dacca 102, Gorukpore 182, Jungul Mehals 100, Kumaon 213, Midnapore 94, Muttra 206, Mooltan 241, Nagpore 258, 264, Pegu 151, Prome 141, 142, Palamow 125, Purnea 70, Patna 56, Raepore 267, 268, Shorapore 275, 281, Sagur and Nerbudda Territories 256, Shajehanpore 210, Shahabad 61, Sontal Pergunnahs 72, Soonderbunds 82, 85, Singboom 124, Salween and Sitang districts 146, Tharrawaddi 144, Uplands of Bengal 36.
Warden .. 19
Wake .. 56
Weeks .. 98
Wise, (J. P.) .. 19
" (T. A.) 101, 104
Wingate .. 19
Willis 65, 94, 220
Wight 71, 72
Williams .. 262
Wood .. 73
Wurda .. 271

Y.

Yule .. 17
Yunan .. 139

CENTRAL SECRETARIAT LIBRARY
GOVT. OF INDIA

KB

SAVIELLE and CRANENBURGH, *Printers*, BENGAL PRINTING COMPANY LIMITED.

NOTE.

THE haste with which this Volume was passed through the Press, will, it is hoped, serve as an excuse for many of its more prominent failing: in the matter of Orthography, the spelling of the document quoted has been followed, which will account for the anomaly of Names differently spelled in different places, as *Rarhia* at page 62, is Rurrea, at page 64, and Rarea at page 185.

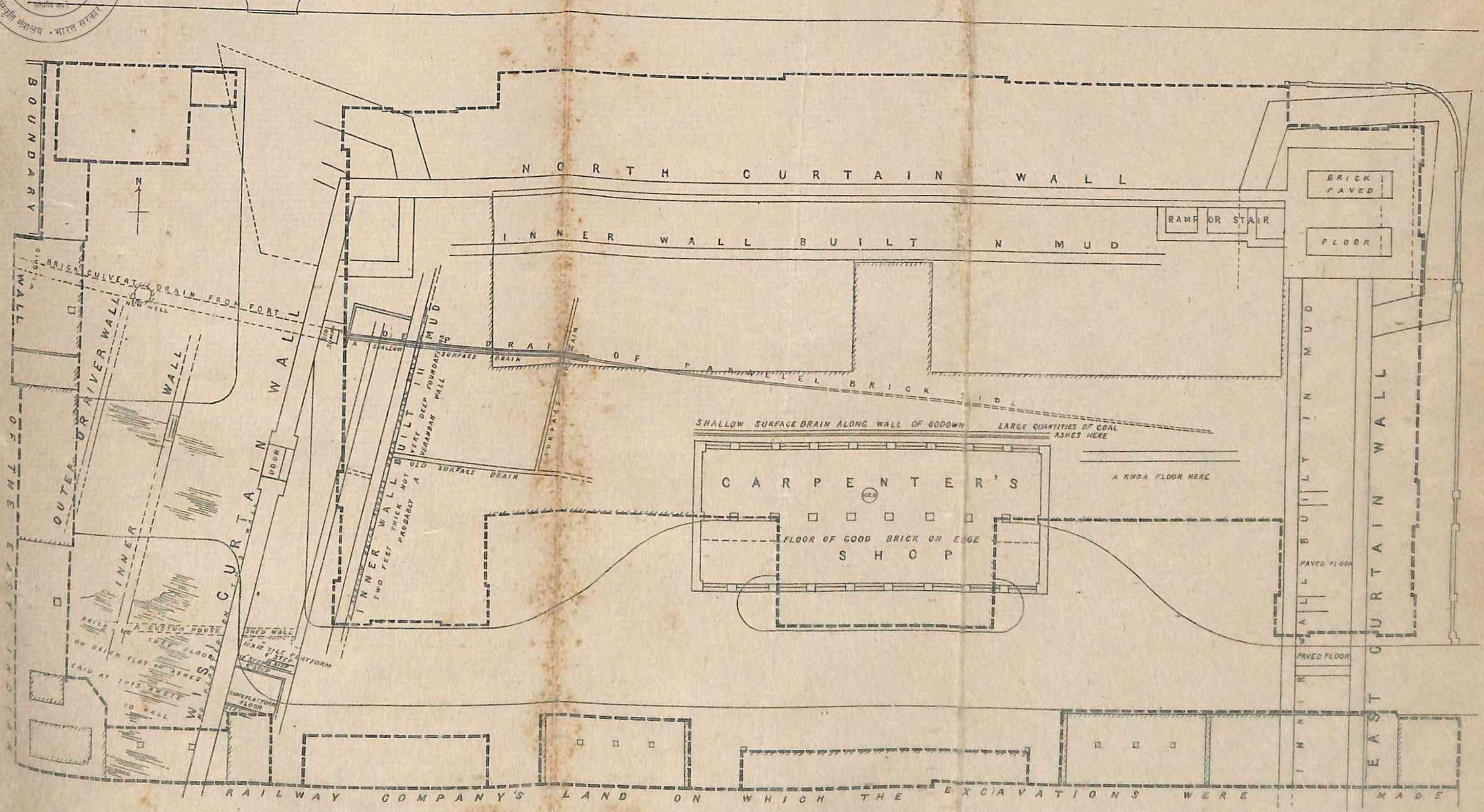
ERRATA.

Page 8,	Line 8	from bottom,	for acceptible	*read*	acceptable.
„ 10	„ 6	„ „	„ decidely	„	decidedly.
„ 20	„ 12	„ „	„ Windgate	„	Wingate.
„ 28	„ 13	„ „	„ Northen Sircars	„	Northern Circars.
„ 59	„ 3	„ „	„ Abohawah	„	Âb-o-hawah.
„ 62	„ 13	„ „	„ Quinten	„	Quintin.
„ 73,	Note		„ proprietory	„	proprietary.
„ 76,	Line 10	from top	„ Rebling	„	Rehling.
„ 85	„ 14	„ „	„ Baliser	„	Ballissur.
„ 139,	Note		„ Luckimpore	„	Luckipore.
„ 157,	Line 3 & 17	from bottom	„ Houghton	„	Haughton.
„ 170	„ 2	„ „	„ importations	„	exportations.

At the top of page 14, the quotation does not commence until the second line, the inverted commas should stand thus, "It is evident, &c.

MINISTRY OF CULTURE · GOVERNMENT OF INDIA
संस्कृति मंत्रालय · भारत सरकार

CSL



ROSKELL BAYNE'S EXCAVATIONS, 1882.